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MICROPHTHALMOS WITH CYSTS OF THE GLOBE.

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CONGENITAL cysts of the lower lid are sufficiently rare to justify a full description of such examples of them as come under the notice of the surgeon.

This is especially true when it is possible to make a further examination of them after removal.

It was not until Kundrat of Vienna accurately described* both the macroscopic and microscopic appearances of these tumours, with their surroundings, that much can be said to have been known about them. Of those cases previously recorded very few had been removed, and still fewer subjected to examination by the microscope. They were very generally thought to have no necessary connection with the eyeball. A reference to the chief points in Professor Kundrat's paper will be useful in comparing them with the description of another case to be given later on. (1.) These cysts always occur in the lower lid, and lie medially or more towards the inner side; they present a hemispherical and (usually) bluish

* Wiener Medizin. Blätter, Nr. 51, 52 (1885) und 3 (1886).

protuberance, which shows through the skin and encroaches upon the inter-palpebral aperture from below, and converts it into an arched slit with its convexity upwards. (2.) They accompany microphthalmos, and especially the so-called anophthalmos.

(3.) In one half the cases referred to they were bilateral, in the other half unilateral, and more frequently on the right side.

In previously published cases not much is said about the true character of these cysts, since most of them were observed on the living subject only, or the observer contented himself with puncturing the tumour. A good deal of stress was also laid on the character of the fluid contained in the cyst.

Talko, who made an examination after removal, denies that there is any necessary connection between the cyst and the eyeball. Manz, on the other hand, thought it to be subscleral, and concludes, as Arlt noticed in cases of microphthalmos with coloboma, that it results from the pressing forwards of a staphyloma. These contradictory opinions probably result from the fact that no investigator had examined the anomalous structures, *post mortem et in situ*, so that their relation to surrounding malformations, or to other pathological alterations in the orbit and cranial cavity, had been lost sight of.

In view of the fact that it was possible to examine carefully, before and after removal, a congenital cyst of this sort, it will not only add to the interest which naturally attaches to such cases, but may help to throw some light on their pathology, if the notes of the case and the results of the microscopical and pathological examination be briefly summarised as follows:—Rose G —, aged 3 years, was brought to the Moorfields Eye Hospital on November 5th, 1888. The mother stated that when the child was born it was noticed that she had no eyeball on the left side, and that there was a swelling in the lower lid, which has not altered since, except to increase

in size. The patient is her fifth child; the other children are free from any deformity or malformation, nor does she know of any defect in either her own or her husband's family.

The child was born on September 20th, 1885. In the previous March, that is, in the third month of her pregnancy, she received a fright from a cat jumping out from a cupboard.

The child appeared in perfect health, and was well nourished; apart from the eye there was no malformation of any part of her body to be detected, even after a very careful examination. The right eye was normal. On the left side a rounded fluctuating swelling bulged forward the lower lid, which was somewhat everted. The cyst appeared bluish in colour through the freely moveable skin of the lower lid; it was the size of a pigeon's egg, and appeared fixed far back in the orbit to a very small globe whose cornea was directed upwards.

The lids and canaliculi were otherwise normal, and tears were shed when she cried.

On November 15th, whilst the child was under the influence of chloroform, an incision was made in the skin of the lower lid, about three-quarters of an inch from and parallel to the border of the lid—subsequently the lower lid was divided in the middle by a second incision at right angles to and united with this first. The cyst was then dissected out from beneath the orbicularis and the conjunctiva of the lower lid. Posteriorly the cyst was found to merge into the small globe which was freed from its surrounding muscles and connections, and the whole mass removed. During the dissection the cyst was pricked, and clear fluid escaped.

In a few weeks, when the wounds had firmly united, the general appearance of the orbit was found to be greatly improved, and the socket was now capable of retaining an artificial eye.

Mr. E. Treacher Collins' report is as follows:—

Pathological Report. By E. TREACHER COLLINS.

Specimen consisted of a small eyeball, with a cyst (which had been cut into) attached to its inferior surface.

The eyeball measured 11 mm. laterally, 9 mm. vertically, and 13 mm. antero-posteriorly. Anteriorly there was a small narrow strip of opaque cornea measuring 3 mm. laterally and 2 mm. vertically. Posteriorly was the optic nerve surrounded by its sheath, while springing from its inferior surface and the extreme posterior part of the eyeball was a large cyst, measuring, when distended, 17 mm. vertically and 15 mm. antero-posteriorly. Springing from the lower and inner side of the optic nerve was a circular mass which had been cut across, and which consisted of an external sheath and a central grey portion like brain substance. In diameter it was about twice the size of the optic nerve.

The specimen was hardened in Müller's fluid for three weeks, the cyst was then filled with absorbent cotton-wool, dipped into water and so distended, the whole specimen was next frozen, and an antero-posterior section made through the eyeball and cyst.

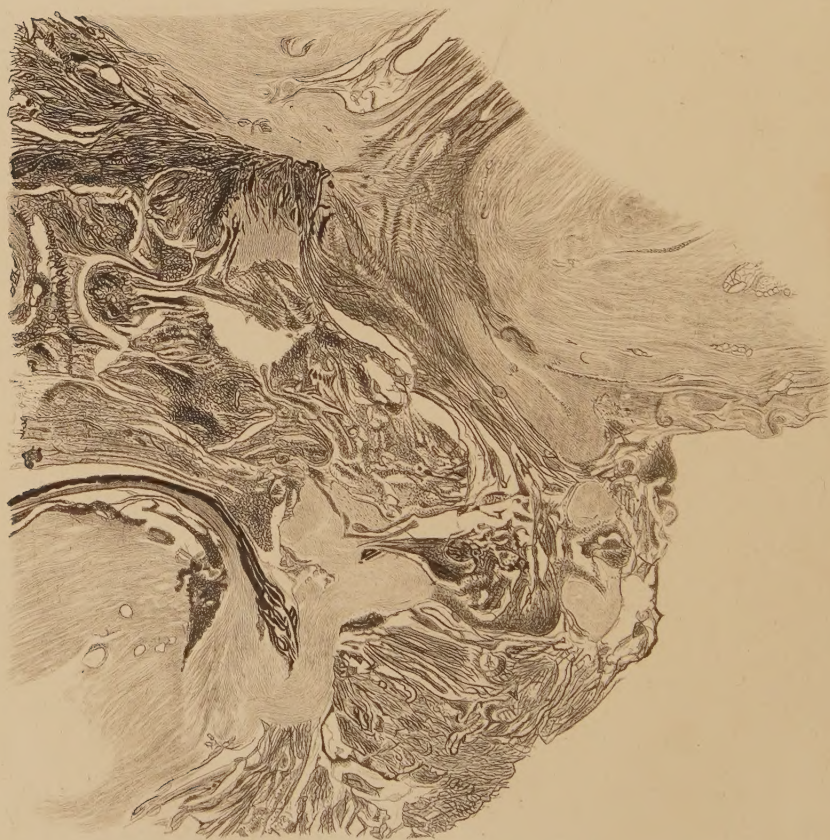
The inner half contained the whole cornea and the portion of tissue mentioned as springing from the inner and lower side of the optic nerve, the outer half contained the whole of the optic nerve.

The cyst wall, which was very thin, was seen to be continuous with the sclerotic at its posterior part; this was especially well marked at the lower part of the specimen. Next to the sclerotic was a brown coloured layer, and inside this a deeply pigmented layer (the pigment layer of the retina), which ran into the isthmus which joined the cyst to the eyeball. The interior of the eyeball was filled with the lens, which in proportion to the rest of the eye was larger and more circular than usual, and of a brown colour; posterior to it there was a greenish gelatinous-looking mass. At the lower part, projecting into the cyst and closing what would have been a communication of the interior of the globe with the cavity of the cyst, was a greyish mass, the colour of the grey matter of the brain. This had on the surface turned towards the cavity of the cyst several little projections.



A. Danielsson, del.

Fig. 1.

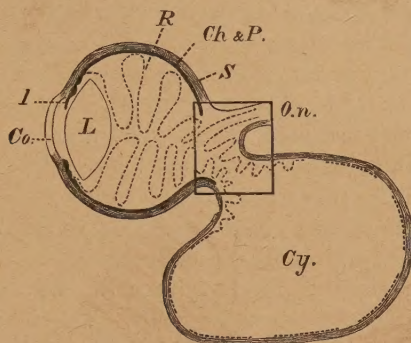


M. H. Lapidge, del.

Fig. 2.

Danielsson & Co. sculp.

The interior of the cyst was very uneven, due to numerous projecting bands. The sheath of the optic nerve was continuous with the wall of the cyst at its upper part. The circular mass starting from the optic nerve had its sheath continuous with the sheath of the optic nerve, while the grey central portion was continuous with the gelatinous mass in the interior of the eyeball.



Explanation of Figure.—Diagrammatic sketch representing the eyeball, optic nerve, and cyst. Co, cornea; L, lens; I, iris; R, retina, much folded; Ch and P, choroid and pigment epithelium; S, sclerotic; O.n, optic nerve; Cy, cyst. The striated band of fibrous tissue represented as forming the sclerotic at S should have been continued round the adjacent curve as the nerve-sheath to O.n. The part marked off by straight lines is shown magnified in the accompanying plate.

Microscopical Examination.—The sections show the fibrous tissue of the sclerotic to be continuous above with that forming the sheath of the optic nerve, and below with the fibrous tissue forming the outer portion of the wall of the cyst. The fibrous tissue of the lower part of the sheath of the optic nerve joins that of the upper wall of the cyst; thus separating the nerve fibres of the optic nerve from the retinal elements in the interior of the cyst, which are described below. The fibrous tissue of the sheath of the optic nerve and sclerotic is also continuous with that forming a sheath to the grey substance mentioned as springing from the inner side of the optic nerve. The lamina cribrosa is well marked. In those sections cut above or below the neck of the cyst, the sclerotic is continuous around the posterior part of the globe. In those through the neck of the cyst, the sclerotic is broken up into isolated

bundles of fibrous tissue, in the intervals between which is a tissue continuous with, and of a similar structure to, the retina.

The ciliary processes and muscle, together with the choroid, are well developed. The latter terminates above at the entrance of the optic nerve, and below at the lower wall of the neck of the cyst; between the lower part of the optic nerve and the upper part of the cyst there is no trace of choroid. On tracing the pigment layer of the retina it is seen inferiorly to bend round and lie along the neck of the cyst, the pigment then becomes somewhat broken up, and ends where the cyst commences to expand. Above the optic nerve the pigment of this latter is more scattered; there is no pigment between the lower part of the optic nerve and the upper wall of the cyst.

The retina is thrown into numerous folds and almost entirely fills the vitreous chamber of the eye, its nuclear layers are the only ones which can be distinctly made out, and these only in places; not any rod-cone layer can be seen. Müller's fibres are very distinct in some parts. The substance of the retina is chiefly composed of a network of fibres and fine branching cells with delicate processes supporting a number of deeply staining nuclear bodies. At the posterior part of the eyeball, tissue of this structure, continuous with that contained in the eyeball, passes between the bundles of fibrous tissue above mentioned, and projects into the cyst. It can be traced for a short distance, forming an inner lining to the wall of the cyst. Sections of the posterior part of the wall of the cyst also show scattered patches of nuclear bodies. The remainder of the wall of the cyst is made up of fibrous tissue, the fibres of which are very wavy, and have between them numerous spindle-shaped cells.

The grey mass projecting from the lower and inner side of the optic nerve, and surrounded by a sheath as above mentioned, is composed of a structure similar to that forming the retina, viz., a network of fine fibres, cells with delicate processes, and scattered nuclear bodies.

The corneal epithelium is badly developed, the cells composing it are small and rudimentary. The anterior layers of the lamellæ of fibrous tissue are very irregular and the corneal corpuscles are numerous. Descemet's membrane, with its lining epithelium, is well developed.

The iris is small but well formed on the side of the section which corresponds to the upper part of the globe. On that which corresponds to the lower part the iris is only represented by a small round nodule. The cyst was situated in exactly that position which is the most common seat for a coloboma of the choroid, viz., at the lower border of the optic nerve; this, together with the presence of a coloboma in the iris, would suggest that the origin of the cyst was in some way connected with the imperfect closure of the choroidal fissure. The presence of patches of retinal elements in the wall of the cyst, even at its most posterior part, would seem to indicate that the retina and sclerotic—which are always bulged at the seat of a coloboma, sometimes to such an extent as to produce the appearance of a deep cup with an abrupt bending of the vessels when viewed with the ophthalmoscope—have in this case become extremely staphylomatous. The non-formation of the vitreous chamber and the increasing growth of the retina have ultimately closed the communication between the cavity of the cyst and the interior of the eyeball. Fluid accumulating in the cyst has helped to increase its distention, and, consequently, the thinning of the previously stretched retina lining the coloboma.

The circular mass on the inner and lower part of the optic nerve would, from its microscopical appearance, seem to be a second bulging of somewhat similar nature, but situated further back.

This case must be regarded as an exception to Kun-drat's generalization, viz.:—That accompanying the cystic microphthalmos there is always to be found some other congenital malformation, such as hare-lip, nasal cleft, &c. No such developmental defect was discoverable. He thinks also that true absence of the eyeball is either extremely rare or does not exist; that, in fact, a careful search will always lead to the discovery of the bulb, reduced, it may be, to the size of a hemp seed, but lying at the bottom of the conjunctival sac.* Even when reduced to this size

* Snell (Trans. Ophth. Soc., vol. iv, p. 333) gives an interesting *résumé* of the literature of this subject up to July, 1884. He quotes Van Duyse, who suggests some causal relation between the coloboma and the cyst, and recognises how easy it would be to overlook a well-marked microphthalmos

the condition is the result of secondary changes, bringing about absorption of previously formed rudiments. Ordinary cases of microphthalmos may be readily explained by a lack of development of the vitreous, and by an early interference with the closure of the foetal ocular fissure.

Regarding anophthalmos as only a high degree of microphthalmos, one may proceed further and trace this condition to an early deficiency in brain development (as was well shown in one of Kundrat's cases), where the normal evolution of the primary optic vesicle is interfered with.

Manz thinks that anophthalmos and microphthalmos are due to a lack of development of the muscular apparatus and of the orbit as a whole, but such cases as the one described here point first to an intra-uterine cerebral defect as the first cause, interfering in various degrees (corresponding to the degree of microphthalmos) with the development of the eye from the primary and secondary optic vesicles.

Regarding the cystic formation with which this paper has principally to deal, Arlt thought that intra-ocular pressure operating on the weakened wall of a colobomatous eye (such as is present in all these cases), where not only the choroid is absent, but the sclera and retina are partially deficient or lacking in normal thickness and strength, might bring about *ectasiæ* of the lower wall, in the region of the foetal cleft.

On the other hand, the results of the microscopic examination point to another explanation—a much more complex one. The retinal tissue, or more properly the tissues of the primary optic vesicle, project forward through the open foetal fissure into a mass of embryonic connective tissue, and (having been surrounded by it become shut off, and then go on to cyst formations.

in the presence of such a tumour, unless a careful search were made for it. Van Duyse regards congenital cysts containing serous fluid as the result of a staphyloma of the weakened scleral wall corresponding to the choroidal and retinal coloboma.

Probably the embryonic areolar tissue masses (~~found in this case~~) surrounding the cyst cavities is vitreous from the mesodermal layer which has only been partially developed. After being in this way shut off from the body of the bulb, active growth in the separated portion does not cease, but up to a certain point proliferation of the elements proceeds, and it is easy to understand how in such an atypical growth of retinal tissue there can be no such regular size, number, or arrangement of the cysts so formed.]

There is, however, as Kundrat points out, one constant factor; the cyst or cysts retain until growth ceases their first relation to the diminished bulb; they are found below and in front. The minute anatomical description which Mr. Collins has given differs in one important point from Kundrat's: the larger cyst was only partly clothed with retinal elements and these, when present, were disposed in thin patches. This disposition would bear out the idea which Von Arlt held, viz., that the cystic formation is more the result of an expansion of a weakened and thinned scleral wall—a true sclerectasia—than simply a portion of the bulb shut off, as it were, from the main part of the eye by an attempted closure of the foetal fissure. Kundrat looks to a defect in development of the middle cerebral vesicle* as the cause of the malformations which characterise these cysts, and the microphthalmos which invariably accompanies them, and in several of his cases gross deformities in the brain structure were discovered. If this be true it must mean that the arrest of development occurs very early in embryonic life, as it is at an early stage that the eye is shut off from its influence.

In Kundrat's article are figured several cysts of various sizes. The protuberance mentioned in Mr. Collins' report may be a very small tumour of the same nature.

* Michel (quoted by Snell, *q. v.*) in 1881 "*Annales d'Oculistique*," vol. ii, p. 144, reports a case where, with arrested development of one half the cranium, both the optic nerves and olfactory lobes were absent. He thinks that the non-development of the brain was the primary anomaly.

REMARKS ON KERATITIS PUNCTATA OR DESCOMETITIS.

By J. B. LAWFORD.

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THE name Keratitis Punctata has, unfortunately, been employed by writers on ophthalmology to designate at least two conditions which differ materially in their nature, although not very dissimilar in their general appearance. Some doubt has, in consequence, arisen as to the exact significance of the term. As I have recently looked up the literature of the subject, I venture to make the following observations, in which, I may say at the outset, there is nothing new.

Wardrop in 1808 first described *aquo-capsulitis vel inflammatio tunicæ humoris aquei*, "an inflammation of the parietes of the aqueous chamber and especially of the membrane which lines the internal surface of the cornea."

Tyrrell,* writing in 1840, defined *aquo-capsulitis* as "Inflammation of the aqueous membrane with deposition of fibrin." His description of the appearances met with in such cases would in many respects be adequate for a text book of the present day. He says—"Attentive examination of the cornea evinces that the morbid change is not in the substance of the cornea or in its conjunctival surface, but subjacent to the former, in the membrane which lines its concavity or posterior surface." The same writer states that "the iris participates in the inflammatory action which extends to it from the aqueous membrane by vascular connection."

Jacob, in his classical work on "Inflammations of the Eyeball" (1849), discussed this subject at some length. He looked upon *aquo-capsulitis* as a special and peculiar form

* Tyrrell. "On the Eye," vol. i, p. 304.

of inflammation, affecting the lining membrane of the aqueous chamber, and expressed his firm conviction that this membrane (which he likened to that lining serous cavities) might be inflamed "without any accompanying inflammation of other parts of the eye."

The name was retained by Mackenzie in the last edition of his Treatise "to designate a very distinct disease;" he explained however that the term was not strictly correct, "as neither the front of the iris nor of the lenticular capsule has any epithelium." He also noted that the iris was frequently involved, although, as he believed, devoid of an anterior epithelial layer.*

Aquo-capsulitis is now an almost obsolete term, at least in print.

Sichel was, I believe, the first to use the name "Kératite ponctuée."

By some authors keratitis punctata is held to signify an inflammation of the corneal tissue proper in which the haze is not uniform; either there is slight diffuse cloudiness with dots of denser opacity, or there are dots of opacity with clear or nearly clear intervening spaces. This is the strictly correct use of the term. The majority of writers however mean thereby a condition in which the dots are situated not in the layers, but on the posterior surface, of the cornea. They are usually at the central lower part and exhibit a peculiar triangular arrangement. The name is thus interpreted by all British writers of the present day, and albeit, as thus used, it is not quite accurate, and, if taken in its literal meaning, gives at the outset a false idea of the pathology of the affection, it has become so widely known that there is but scant hope of success in attempting to substitute another name, more in accordance with our present pathological knowledge.

Among foreign authors the same uniformity is not

* Consult also Proél. "Inflammatio tunicae humoris aquei," V. Ammon's Zeitschrift, iii, p. 42. Wedermeyer, N. Biblioth. f.d. Chir. und Ophth., iv, 66.

observed. Stellwag* under this heading speaks of dotted opacity in the posterior laminæ of the cornea, sometimes extending as far forwards as Bowman's membrane; he also alludes to the punctate deposits on Descemet's membrane occurring in the course of irido-choroiditis.

Meyer† makes mention of a variety of parenchymatous corneitis affecting the deep layers, which, when it extends to Descemet's membrane gives rise to the special form of disease which has received the name *keratitis punctata*.

Schmidt-Rimpler‡ would restrict the term to a real *keratitis*, in the deep layers, and speaks of its incorrect application to an affection of Descemet's membrane.

All other foreign writers to whose works I have been able to refer, employ the name *keratitis punctata* in its generally understood sense, and mean thereby a condition signalised by small collections of cells on the posterior surface of the cornea. Several do not describe it under diseases of the cornea, but as "an accessory and secondary symptom of inflammation of the vascular tunics of the eye."

The most generally employed name next to *keratitis punctata*, and of more recent origin than it, is "*Descemetitis*." This, though not strictly correct, has this advantage: it cannot lead to any confusion between the condition indicated and a genuine affection of the cornea. From a pathological standpoint also it is nearer the mark. Although the changes in Descemet's membrane are I believe never primary, there is no doubt that this membrane is much more likely to be affected than the corneal tissue proper. To this point I shall refer again.

The error into which the earlier observers quite excusably fell was that of looking upon *keratitis punctata* or *aquo-capsulitis* as a disease *sui generis*. We now know that it is merely a symptom of disease of the deeper parts

* *Lehrbuch der prakt. Augenheilk.* 1882, p. 78.

† "*Pract. Treatise on Diseases of the Eye.*" Eng. Edit., 1887, p. 111.

‡ *Augenheilk. u. Ophthalmoskopie*, 4te Aufl., 1889.

of the eye, and probably of the uveal tract alone. We do not know the precise relation it bears to such affection, nor of what value it is as an indicator of the exact seat or the cause of the disease.

But little has been written in recent years on this subject, and almost entirely from the clinical side. Opportunities seldom occur for the microscopical examination of eyeballs affected by keratitis punctata except in the case of sympathetic ophthalmitis; in these latter instances there are such extensive and marked changes in nearly all the tissues that the dots of deposit on Descemet's membrane are rarely more than mentioned in the microscopical description. In addition it is by no means easy to prepare microscopical sections and retain the corneal deposits *in situ*.

Schweigger* seems to have been the earliest observer who described the microscopic appearances of the cell-heaps which form the dots visible through the cornea. He considered them due to morbid proliferation of the epithelial layer of Descemet's membrane.

Ivanoff,† who gave a good description of the deposits, held that the cellular elements were derived from the cells of Descemet's membrane, as a result of irritation.

Arlt‡ stated that the dotted deposit on the cornea was indicative of cyclitis.

The descriptions of the microscopic characters of the dots in question vary somewhat. All writers are agreed that the little conical or mound-shaped deposits are, at least in part, composed of cells, but opinions differ as to the nature of these cells. Thus one writer speaks of them as round cells produced by the proliferation of the epithelium on which they rest, while another states that he has no doubt that they are migrated and altered leucocytes, and that the epithelial layer beneath them plays no part in their production. Others again hold that the cells

* Handbuch, 1873, p. 346.

† Graefe-Saemisch., vol. iv.

‡ Arlt. "Diseases of the Eye." Eng. Transl., by Ware, 1885.

may be the progeny of surface cells in the iris, ciliary body, or choroid, whence they have travelled forwards and become deposited on, and adherent to, Descemet's membrane.*

These cells, whatever their origin, are not the only elements found in the deposits. Small granular particles and pigment have been described, and in some instances threads of fibrin are noticeable. I have never seen pigment granules in the cell-clusters. In a certain number of cases, in addition to the punctate deposit, there is a thin layer of fibrinous material on the posterior surface of the cornea, extending over a much larger area than that occupied by the cell-heaps.

The condition of the epithelial cells of Descemet's membrane, in the cases which have been examined microscopically, has hardly been accurately determined. I think, from the appearances in the few specimens I have been able to examine, that the cells certainly undergo some change at those points at which the cell-heaps are situated: their outline becomes indistinct, and they appear swollen. But I am strongly inclined to the opinion of those writers who believe that the cells in the deposits are not due to proliferation of the epithelium, but are migrated cells from some other part of the eye. The changes in the epithelium, if present, might very well be secondary. I do not know that any good explanation has been given of the very striking arrangement in a triangle of the punctate deposits; it seems to me, however, that if these cell-heaps resulted from morbid proliferation of a continuous layer of epithelium they would be less likely to be so arranged than if they were formed of cells floating in the aqueous, and possibly influenced by the direction of the flow through this fluid.

* *Vide* Fontan: *Rec. d'Ophthal.*, Nov., 1888; *Oph. Review*, Feb. 1889. Knies: *Archives of Ophthal.*, vol. ix. Hill Griffith: *Trans. Ophthal. Soc.*, vol. vii. Wecker and Landolt: *Traité complet*, T. ii, p. 281. Ivanoff, *loc. cit.* Tansley: *Amer. Journ. of Ophthal.*, iii, 4, 98.

We know, moreover, that in a large majority of cases there is visible affection of some portion of the uveal tract, and it is not improbable, as suggested by Nettleship, that in the remaining cases similar changes might be discovered if looked for with sufficient care. It is much more reasonable to suppose that in inflammation of such a richly cellular and highly vascular structure as the uveal tract, numbers of small cells would be set free in the adjacent fluids (aqueous and vitreous), than that a single layer of epithelium should, by proliferation, give origin to the cellular elements present in the deposits.

In some instances dots of opacity very similar in appearance to those on the posterior corneal surface have been seen during life on the lens capsule. At least one observer* has also found them in microscopic sections, on the anterior lens capsule and anterior surface of the iris. I have myself seen them in the latter situation in several specimens. The presence of these clusters of cells is certainly in favour of their origin from the iris or ciliary body rather than from the epithelium of Descemet's membrane.

Large numbers of cells, closely resembling those in the deposits on the cornea, are usually present in the angle of the anterior chamber in these cases. This fact merely indicates that being free in the aqueous they have drifted with the stream, and does not help to explain whence they came.

If we assume, as I think we may, that the cell-clusters on the posterior surface of the cornea are derived from the uveal tract, we naturally wish to narrow the question and ask from what part of this tract they come—the iris, ciliary body, or choroid. This, I think, cannot yet be positively decided. There are clinical cases in which, with typical corneal deposits, the iris appears unaffected, its action to light and mydriatics remaining good. In these cases, moreover, there is generally visible disease of

* Fontan. *Loc. cit.*

choroid. I have recently had just such a case under observation, in which there was no evidence of involvement of the iris, and in which there was a large isolated patch of choroiditis near the optic disc. It is tempting to conclude that the cells on the cornea come from the inflamed choroid, in such instances, but it would, I think, be rash to assume that the iris is quite free from change, from clinical evidence alone.

A study of the development of the tissues affected in keratitis punctata affords us no assistance. The uveal tract and the posterior epithelium of the cornea are both derived from mesoblast; there is some doubt, however, as to the exact part of this layer from which the epithelium originates. There still exists some uncertainty concerning the anterior surface of the iris. The older observers were convinced that a single layer of epithelial cells directly continuous with those on Descemet's membrane, covered the front surface of the iris. This was denied by more recent authors, but at the present time the majority of writers describe such a layer which they hold to be an extension of that on the posterior corneal surface, from which, however, it is said to differ somewhat in the character of its cells.*

* Wecker and Landolt: *Traité complet*, tome ii, p. 265. Meyer: "Practical Treatise," p. 152. Quain's "Anatomy," 1882, vol. ii. Pollock: "Histology of the Eye," p. 48.

ON SOME UNUSUAL CASES OF INJURY TO THE EYE AND ORBIT.

By J. HUTCHINSON, Junior.

A LIST of the various foreign bodies that have been found lodged in the vitreous would be an almost unending one. The following case, under Mr. Waren Tay, is a curious example:—

Arthur C., æt. 12, fell across some iron railings with horizontal bars, injuring one eye so severely that it became necessary to excise it. On dissection a complete tin-tack was discovered in the vitreous; the nail measured 1 cm. in length, and its head was about 6 mm. in width. There had been no special reason to suspect the presence of a foreign body, and the boy stated afterwards that there were no nails in connection with the railings. The position of the nail and its exact size are shown in the accompanying drawing. It would seem theoretically almost impossible for a tin-tack with its broad head to traverse the sclerotic, unless through a very large rupture, which did not exist in this case. The specimen is preserved in the Moorfields Hospital Museum.

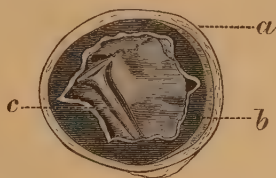


FIG. 1.—*a*. Sclerotic; *b*. Blood effused between sclerotic and retina; *c*. Tin-tack.

My friend, Mr. Percy Dunn, recently recorded* a remarkable instance of perforation of the globe by the knotted end of a whip. Panophthalmitis rapidly came on, and the eye was excised, the foreign body being then

* Illustrated Medical News, Nov. 10, 1888.

found lying in the vitreous. In this case there was a large jagged wound at the sclero-corneal margin.

A boy, æt. 9, came under my care at the Great Northern Hospital with the anterior chamber of one eye half full of brick-dust. The bright red particles lying between the iris and cornea gave the eye a most curious aspect. The injury was due to another boy having thrown a brick at him a fortnight previously; the rupture was at the sclero-corneal junction. Needless to say that the eye required excision.

Cases in which the cornea or ciliary region has been penetrated by some sharp instrument, but in which we can feel practically certain that no foreign body is imbedded, often present most difficult problems as to treatment. I wish to record the two following cases as bearing upon one point in particular, viz., the date at which the prolapsed part of the iris should be excised, when it has been determined to save the eye.

According to Mr. Nettleship* the iridectomy "may be done as much as three or four days after the injury." It happened that in my two cases it was not performed until six and eight days respectively had elapsed, and no difficulty was found at the time of operation, the result being also very good as regards vision, &c. I do not mean to advocate waiting so long in ordinary cases, but special circumstances caused the delay, and it is interesting to note that no harm whatever resulted from it. There is a distinct advantage in allowing two or three days to elapse before operating, as we can then see whether violent reaction or suppuration would render excision a more appropriate operation than iridectomy. It may be said, on the other hand, that such a delay causes the iris to become united to the wound, and renders the iridectomy more difficult; this may be so in some cases, but in neither of the following was there any difficulty in drawing out the iris.

William D., æt. 15, a mechanic, was engaged in straightening

* "Diseases of the Eye," p. 147.

a coil of telegraph-wire, when the end struck him violently in the left eye. He came to the Great Northern Hospital shortly afterwards; there was a wound of the cornea close to the ciliary margin, and the anterior chamber was full of blood. He was at once admitted, and ice and atropine were applied. The hæmorrhage was rapidly absorbed, and it was then found that the iris was somewhat detached from its point of ciliary insertion opposite to the wound, and prolapsed into the latter. Careful enquiry rendered it certain that the end of the wire could not have broken off, and there was no wound of the lens capsule. The anterior chamber refilled well, but the prolapse became more marked, and on the sixth day (as soon as the father's permission for an operation could be obtained) the prolapsed part was drawn out and freely excised. As usual, it was easy to free one edge of the iris from the wound, but a slight adhesion remained below.

There was some abnormal vascularity of the iris, but no other evidence of iritis. Under the vigorous use of atropine and ice the eye remained quiet, and the patient was discharged on the fifth day after the operation.

I have seen him several times since the accident during the eight months that have elapsed; there has been no irritation of either eye, and he sees as well with the injured one as with the other. The anterior synechia has persisted, and there is a large coloboma, but it gives him no trouble; V. = $\frac{6}{6}$ and 1 J.

Mary Anne T., æt. 8 years, was admitted into the Great Northern Hospital for a wound of the L. globe, inflicted, I believe, with a knife. The sharp edge had cut through the lower eyelid (this wound was united with silk and healed rapidly), and then passed through the sclerotic and cornea, the former being implicated to the extent of 3 mm. The iris was divided opposite to the wound, and it seemed probable that the lens capsule would also be implicated. This, however, proved not to be the case.

The iris was adherent to the wound, but did not at first prolapse much. Atropine and ice were vigorously used.

On the 4th day, pupil 6 mm., considerable ciliary congestion, more bulging at wound, no iritis.

The child's father was very difficult to find, and it was not until a week had elapsed that permission could be obtained for "an operation." On the eighth day the attached and prolapsed part of the iris was excised. The wound rapidly united, the ciliary congestion subsided, and the vision was equally good in both eyes.

It may be held that the only safe treatment in this case was to excise the eye, but as the ciliary wound was clean cut, and as no marked inflammatory reaction followed, it seemed justifiable to use conservative treatment. The patient's father was charged to bring the child back to the hospital if any symptoms of irritation appeared, but I lost sight of the case when some months had elapsed; the eye then remained quite quiet and vision was practically perfect.

Case of a Slate Pencil almost two inches long imbedded in the Orbit for several weeks; the Eye escaping injury.

The following remarkable case occurred under the care of Mr. Waren Tay, at Moorfields, and he has kindly allowed me to publish it:—

A boy, Alex. H., aged six years, was brought to Moorfields first on December 13, 1888, on account of the condition of his right eye. There was much œdema of the lower lid, with general conjunctival congestion, and slight discharge.

There was a little bud of granulations at the outer canthus, with slight discharge of lymph from its depressed centre. There was a small cruciform scar over the outer end of the upper eyelid. The history of the case was as follows:—About six weeks previously he had fallen downstairs, but was not known to have injured the eye in the fall. The doctor who sent him to the hospital considered the case to be one of conjunctivitis aggravated by the injury. The presence of the sinus, however, excited suspicions of a foreign body being lodged in the orbit, and Mr. Tay, therefore, had the boy anæsthetised, dilated the sinus with dressing forceps, and felt a rough substance in its interior. With the forceps the foreign body, a piece of slate pencil of the exact size shown in the woodcut, was extracted. It apparently lay in the antero-posterior

axis of the orbit, and its length ($1\frac{1.5}{16}$ "') made it certain that the point must have been close to the very apex of the orbit, possibly in the sphenoidal fissure.



FIG. 2.

The boy rapidly recovered, there being no irritation in the eye or impairment of its movements. Vision with either eye

was $\frac{6}{12}$.

I saw at the London Hospital two years ago a somewhat similar case, although the region in which the foreign body was imbedded was not the orbit. A young man came under care for a small sinus in the dense tissue of the heel, around which there was considerable granulation-growth. No cause could be found from the patient's history, but suspecting that there might possibly be a foreign body beneath the granulations, I made an incision and extracted a piece of shoe-leather, which was completely imbedded in the subcutaneous layer. How it got in was unexplained.

It is well known that the orbital tissues may tolerate for long the presence of a foreign body, and De Wecker appears to counsel abstention from operative interference in such a case. His argument is that such interference may set up orbital or intra-cranial suppuration, but the case which he quotes from M. Pagenstecher in favour of this, is hardly a strong one. A knitting-needle had broken in a fall, and part of it had lodged in the orbit of a girl aged seven. Frequent attacks of inflammation, and ultimately sympathetic symptoms in the other eye led to enucleation at the age of 24, and during the operation a foreign body was detected close to the globe. Foetid pus continued to be discharged, the patient had headache and loss of appetite, and about a month later a second operation was performed, and a fragment of needle four inches long

extracted. The patient recovered for a time, but some few months later died of cerebral abscess. Seeing that before the excision of the injured eye was performed there was marked chemosis, it may be conjectured that the foreign body was at that time setting up trouble, and previous to its extraction there were symptoms definitely pointing to intra-cranial inflammation. Had the removal not been attempted it seems quite probable that the same result would have followed. In a case lately published by Dr. Stephen Mackenzie, part of a pen-holder had for years remained in one frontal lobe, the patient being then rather suddenly seized with cerebral symptoms, and dying of an abscess around the foreign body. In this case not only had no attempt at removal been made, but the presence of the pen-holder had not been suspected. The man was under the care of Dr. Mackenzie in the London Hospital, and it was only after careful enquiry after the post-mortem that a history of the accident was obtained.

Case of complete Traumatic Removal of Lens and Iris, with Retention of Fair Vision.

A Turk, aged 25, during a street-brawl in Constantinople, received a blow on the right eye, with either a broken pipe-stem or a piece of iron, the wound running across the upper segment of the cornea, nearly parallel to the section made in flap-extraction. At one end, however, the wound passed right through the ciliary region. In spite of treatment with bread-poultices no severe inflammation followed, and the wound healed well. Some 14 months later he came to Moorfields, where he was examined by Mr. Nettleship. There was no trace of the iris left, and the lens had evidently escaped (probably in its capsule) through the rupture. The ciliary processes were readily seen below, and just above them was a curious translucent fold, which Mr. Nettleship compared to "the ghost of an iris." Above and behind these was an opaque white fold, which might perhaps be the remains of the lens capsule, and at the upper margin were a few smaller white bands. The vitreous was practically clear, but for slight linear opacities running towards the scar. The

optic disc and retina were normal, though the former appeared distorted unless looked at through the exact centre of the cornea. The large size of "the pupil" and the alteration of corneal curvature rendered general vision with this eye very bad, but when a stenopaic disc was placed before the eye he read $\frac{20}{50}$ with + 13 D. V. of the left eye = $\frac{20}{20}$. There was no congestion of either eye, and there had been no pain in the injured one. Should the second eye be injured the patient would still have a fairly useful one to fall back upon. Improbable though such an accident might be, one knows that such a contingency must be allowed for. For example, a man employed in a Government factory was struck on the R. eye by a fragment of steel—traumatic cataract followed with iritis—and the eye was operated on by my friend Mr. Allan Perry with very good result (V = $\frac{6}{6}$ and 1 J. with proper glasses). Within a year his other eye sustained a precisely similar accident, but unfortunately the piece of iron lodged in the back of the globe and enucleation had to be advised.

The case of complete removal of the iris just recorded is similar to one exhibited by Mr. Lang at the Ophthalmological Society's meeting some months ago, and there are a fair number of parallel cases recorded.

AN EXAMINATION OF THE PATELLAR TENDON-REFLEX IN
SIXTY-TWO CASES OF INTERSTITIAL KERATITIS.

By W. LANG,

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THE following investigation is based upon an examination of patients attending, chiefly during the past six months, the Moorfields and Middlesex Hospital clinics of Mr. Lang, at whose suggestion it was first instituted. No case has been included which was not a well-marked example of parenchymatous or interstitial inflammation of the cornea, with or without evident iritis, cyclitis, or choroiditis. To insure uniformity as well as accuracy each patient was examined in the following manner: after the history and present condition had been gone into, and the local signs and symptoms noted, the patellar tendon-reflex was tested. If there were a ready response on both sides it was entered as normal. Decided diminution or apparent absence of the reflex led to a further examination. The person was placed sitting on the edge of a table with bared knees, and instructed to allow the legs to hang loosely. While his attention was directed away from the matter in hand repeated attempts were made with a Winterich hammer to produce the reflex movements. In Table No. I the sign -1 is to be taken to mean that there was, under the most favourable conditions for eliciting a response, but a faint though constant and undoubted movement of the limbs. In those instances

where there was much difficulty in producing, after numerous attempts, any reaction whatever the subnormal state is expressed by -2. In no instance was the reflex entered as absent unless there was proved to be no response whatever to the test applied as above. All these cases of diminished and absent patellar reflex were, moreover, examined at least twice, and most of them oftener as occasion permitted. In the same way a diminution of the normal excitability was considered a special reason for enquiring into possible causes of the condition outside of the mere local affection. The results have been stated in the following tables. The task of getting definite information from the patients or their friends was found to be not an easy one. Probably the number of attacks of interstitial keratitis from which a young adult has suffered during his lifetime is not known by himself, or, in the case of children, by the friendly neighbour who brings them to the hospital. Even the mother when interrogated cannot furnish an answer which will enable one to say positively whether the "bad eyes" her child suffered from a number of years before had been a catarrhal ophthalmia, a phlyctenular keratitis or an attack of specific keratitis. For this reason the date at which the patient first suffered from the disease (Table II) is in a number of instances uncertain. The writers have been to some trouble in their efforts to get at, in each case, the diathesis known to underlie, almost without exception, this form of corneal infiltration. In the absence of the Hutchinson teeth, the scars about the angles of the mouth, the frontal prominences, and the other signs of hereditary syphilis, search was made for indications of strumous or tubercular disease. The report upon the examination of the eyes for concomitant choroiditis, iritis, &c., is necessarily incomplete. Most of the patients were not seen in a condition to determine the existence or absence of deep changes in the eye, and without doubt in a much larger percentage of them uveal and fundus changes

were present than the table would appear to show. The terms employed to indicate the usual state of health are relative only. A man, for example, who was fairly nourished, had a good appetite, and could work, if his imperfect vision had permitted him, was entered as being in good health, even if he was obliged to remain at home. "Bad" health means that the patient had been entirely incapacitated from following his ordinary occupation by

TABLE

No.	Name.	Male or female.	Age.	No. of attacks of disease.	Duration of disease.	One or both eyes.	Any definite history or signs of syphilis or struma?
1	J. M.	M.	22	1	More than 6 months	Both	Cong. syph.
2	F. N.	M.	12	1	More than 2 months	Both	Cong. syph.
3	S. B.	F.	16	1	More than 4 months	Both	Struma
4	E. L.	F.	14	3	About a year	Both	Cong. syph.
5	I. B. S.	M.	21	3 or 4	1 to 6 months	Both	Cong. syph.
6	A. S.	F.	26	1	More than 1 month	Both	Cong. syph.
7	G. C.	M.	14	1	3 months (?)	Both	No
8	C. H.	F.	29	1	3 weeks	One	Cong. syph. (?)
9	L. P.	F.	31	2	Each several months	Both	Cong. syph.
10	A. R.	F.	19	1	2 weeks	Both	Cong. syph.
11	D. D.	M.	12	1	Several weeks	Both	No
12	E. F.	F.	19	2 or 3	Each several months	Both	Cong. syph.
13	B. G.	F.	16	1	1 month	Both	Cong. syph.
14	A. W.	F.	18?	1	8 months	Both	Cong. syph.
15	J. V.	M.	29	1	1 week	One	Struma
16	E. T.	M.	26	2	Several months	Both	Cong. syph.
17	C. H.	F.	29	1	2 months	Both	Cong. syph.

causes outside of the eye affection. "Indifferent" is the mean between these two extremes.

It was thought advisable to note the fact whether or not the patient had been treated by mercurials or iodides, or by both.

Where a space has been left blank, it is intended to mean that no satisfactory answer was obtainable to the question at the head of the column.

No. I.

Other affections of eye observed.	Usual state of health.	Patellar tendon-reflex.	Had patient been previously treated with Hg or KI.	Remarks.
—	Good	Normal	With both Syr. ferri iod. —	Rachitic teeth and enlarged submaxillary glands.
—	—	—2		
—	Good	Normal		
Iritis and choroiditis	Bad Indifferent	Normal Normal	No	Has nyctalopia. Never took medicine of any kind.
Choroiditis	Good	Absent	—	Deaf 10 years. Sister of foregoing.
—	Good	Absent	—	Mentally deficient. No signs of cong. syphilis. Difficult to get information.
Choroiditis	Good	Normal	Both	Otherwise healthy her whole life-time.
—	Indifferent	Normal	Both	Married, but no miscarriages or dead-born children.
—	Good	—1	Both	Family history of tuberculosis only. One sister has ker. inter.
—	Good	—2		
—	Bad	Normal	Both	Had renal disease and subsequent dropsy, but no evidence of organic nervous disease.
—	Indifferent	Absent	—	
—	Good	Absent	Long courses of both	Never been ill in bed.
—	Indifferent	Normal	No	Good health her whole life-time.
Iritis	Indifferent	Normal	Both	
Choroiditis	Good	Normal	Both	

No.	Name.	Male or female.	Age.	No. of attacks of disease.	Duration of disease.	One or both eyes.	Any definite history or signs of syphi- lis or struma?
18	W. F.	M.	21	2	Each several months	Both	Cong. syph.
19	W. M.	M.	30	3 or 4	3 years "off and on"	Both	Cong. syph.
20	T. R.	M.	10	1	3 years	Both	Cong. syph.
21	M. A. B.	F.	15	1	Short time	One	Struma
22	F. S.	F.	14	Several	Each several months	Both	Cong. syph.
23	K. L.	F.	15	2	1 year and 6 months	Both	Cong. syph.
24	G. D.	M.	10	1	Several months	Both	No
25	A. D.	F.	12	Several	4 years	Both	Cong. syph.
26	L. W.	F.	14	1	3 months	Both	No
27	A. L.	M.	27	1	2 months	One	No
28	C. L.	M.	20	2	5 months and 2 weeks	Both	Cong. syph.
29	M. C.	F.	27	Many	Several years	Both	Cong. syph.
30	A. C.	F.	21	1	A week or two	One	No
31	E. M.	F.	13	1	1 week	One	No
32	M. P.	F.	14	1	1 month	One	Struma
33	J. R.	F.	28	2	6 months and 3 mos.	Both	No
34	A. C.	M.	14?	1	6 weeks	Both	Cong. syph.
35	R. D.	F.	27	1	9 weeks	Both	Cong. syph.
36	A. P.	F.	26	Several	Each several months	Both	Cong. syph.
37	E. P.	F.	12	1	1 year	Both	Cong. syph.
38	J. T.	M.	26	1	Months	Both	No
39	F. W.	M.	12	1	2 weeks	One	Cong. syph.
40	F. W.	F.	16	2	6 months and 1 week	One	Cong. syph.
41	C. L.	F.	25	Several	Each several months	Both	Cong. syph.
42	M. S.	F.	21	2	Over a year	Both	Cong. syph.
43	A. J.	M.	14	Many	Over 5 years	Both	Struma

Other affections of eye observed.	Usual state of health.	Patellar tendon-reflex.	Had patient been previously treated with Hg or KI.	Remarks.
Iritis —	Indifferent Indifferent	Normal Normal	KI No	Never taken medicine. Married. Wife no live children, but several miscarriages.
—	Bad	Normal	Both	
—	Good	Normal		
—	Bad	—1	Both	Badly nourished subject, with constitutional disease well marked.
—	Bad	Normal	Both	
—	Indifferent	Normal	Syr. ferri iod.	
—	Indifferent	Absent	—	One of 10 children, 6 living with no "bad eyes." Had only infantile diseases.
—	Indifferent	Normal	Hg	No family history of syphilis.
—	Good	Normal	—	No choroiditis or iritis observed.
—	Indifferent	—1	Both	Chronic periostitis. Syphilitic. Other members of family "bad eyes."
Choroiditis	Indifferent	Absent	Both	Very deaf. Disease "since birth."
—	Good	Normal		
—	Good	Normal	No	Has never taken medicine.
—	Good	Normal	—	No choroiditis could be detected.
Iritis —	Indifferent Indifferent	Normal Absent	Probably both Syr. ferri iod.	One sister had same disease.
—	Good	Normal	—	A very acute attack with pain, photophobia, and lachrymation.
—	Indifferent	Normal	Both	Brother also with disease. No H. teeth, but other signs of hered. syphilis.
—	Good	—1	—	Only child. Mother 3 miscarriages.
—	Good	Normal		
—	Good	Normal		
No traces of iritis or choroiditis	Good	Absent	Probably not Both	Ps.a. V = $\frac{6}{6}$ R. and L.
—	Indifferent	Normal	Both	A first miscarriage, and 1 healthy child.
—	Good	Normal	Both	
—	Bad	Normal	Both	

No.	Name.	Male or female.	Age.	No. of attacks of disease.	Duration of disease.	One or both eyes.	Any definite history or signs of syphi- lis or struma?
44	B. D.	F.	16	1	1 year	Both	Cong. syph.
45	G. C.	M.	36	2	6 months and 1 month	Both	Cong. syph.
46	E. J.	M.	19	Several	For years	Both	Cong. syph.
47	M. C.	F.	50	2	1 year and 1 week	Both	No (?)
48	L. B.	F.	15	Many	Most of life	Both	Cong. syph.
49	M. W.	F.	10	2	4 months and 3 weeks	Both	Cong. syph.
50	L. B.	F.	17	Several	4 years	Both	Struma
51	E. S.	F.	18	2	6 months and 2 months	Both	Cong. syph.
52	A. F.	F.	15	2	1 month and 2 months	Both	Struma
53	J. J.	F.	8	1	1 month	Both	No
54	G. S.	M.	21	2	6 months & 3 months	Both	Cong. syph.
55	P. H.	M.	17	2	Each 1 year	Both	Cong. syph.
56	A. S.	F.	18	1	2 weeks	One	Cong. syph.
57	W. J.	M.	33	Several	Each several months	Both	Cong. syph.
58	J. L.	F.	24	1	6 months	Both	Cong. syph.
59	M. A.	F.	36	1	3 weeks	Both	No
60	W. C.	M.	14	1	12 months	Both	Cong. syph.
61	E. A.	F.	24	Several	Each several months	Both	Cong. syph.
62	F. T.	M.	33	1	3 months	One	Cong. syph.

Of the 62 cases above tabulated 24, or 39 per cent., were males, and 38, or 61 per cent., were females; 13, or 21 per cent., were under 10 years of age when the disease first showed itself; 32, or 51 per cent., were between 10 and 20; while only 17, or 28 per cent., were above 20. Hereditary syphilis was proved to be present in 43 cases, or 69 per cent. Struma was found in 7, or about 1 per cent.; while in 4 no evidences of syphilis or struma could be detected, either in their own persons, or in their

Other affections of eye observed.	Usual state of health.	Patellar tendon-reflex.	Had patient been previously treated with Hg or KI.	Remarks.	
—	Bad	—2	Probably syr. ferri iod.	Lately recovered (?) from some obscure brain disease.	
—	Good	—1	Both	Has rotatory nystagmus.	
Choroiditis and iritis, with eccentric pupil	Bad	Normal	Both		
—	Good	Absent	—	Married, 9 children, 5 living and healthy, 4 dead, 3 miscarriages. No H. teeth.	
—	Bad	Normal	—	Only child.	
—	Indifferent	Normal	—	Very severe attack.	
—	Indifferent	Normal	—	Several other members of family have had same disease.	
—	Indifferent	—1	Hg and syr. ferri iod.	One sister (large family) also had "bad eyes."	
—	Bad	Normal	Hg and syr. ferri iod.	Interval of 4 months before second eye was attacked. Signs and history negative, except doubtful ulceration of tongue. Married.	
—	Good	Normal			
—	Indifferent	Normal	Hg		
—	Good	Normal			
—	Indifferent	Normal	No		
—	Bad	Normal	Both		
—	Good	Normal	—		
Iritis	Good	Normal	—		
—	..	Normal	—		Deaf six years.
—	Indifferent	Normal			
—	Indifferent	Normal			

families, or in their parents. During the continuation of the eye affection the general health was noted as being good in 26 instances, or 42 per cent.; indifferent in 23, or 37 per cent.; bad in 12 cases, or 20 per cent.; not noted 1.

Regarding the knee-jerks, these were found to be normal in 44 cases, or 70 per cent., and subnormal in 18 cases, or 30 per cent.

In not a single instance could the reflex be described

as decidedly exaggerated. Of the 62 patients observed, exactly 50 per cent. (and probably more) had been treated either with mercurials, iodides of iron, iodide of potassium, or with two or more combined, before coming under these observations.

Table No. II is intended to give some further information concerning those cases whose patellar tendon-reflexes were found to be below the normal. As a preface to it, it may be remarked that in each instance the examination of the patient included a search for signs and symptoms (present and past) of those causes known to be capable of producing loss or diminution of the knee-jerk, *e.g.*, ankylosis of the joint; local disease of the lig. patellæ or quadriceps extensor muscle; loss of sensation or motion, or atrophy due to affections of the cord or brain; peripheral neuritis; diabetes; large doses of opium and the bromides; diphtheria, and tabes dorsalis.

Of the 18 cases thus tabulated congenital syphilis may be said to be certainly present in all but three. In one of these, No. 7, there is a clear family history of tuberculosis; in another, No. 47, specific disease is probably not present.

The writers regret that a fuller report upon the pupillary reaction to light and accommodation is not possible. The great majority of the patients were either under the influence of some mydriatic when examined, or the corneal opacity was too marked to properly apply these tests, or the accompanying iritis prevented it, or the photophobia made it uncertain. It is due to one or more of these causes that in only two cases showing subnormal knee-jerks could these extremely important observations be made.

'Tabes, as likely to affect the adult section, and diphtheria as a possible cause of absent reflexes in children have been given a column to themselves. In Case No. 7 it is probable that diphtheritic sore throat, accompanied by some of its nervous alterations, has been the cause of

TABLE No. II.

No.	Age at time of first attack.	Constitutional disease.	Action of pupils to light and accommodation.	Past or present symptoms of diphtheria or tabes dorsalis (?)	Other diseases of nervous system present.	Knee-jerk.
2	12	Congenital syph.	Unable to test	None	None	-2.
6	26 (?)	Congenital syph.	Ditto	None	None	Absent.
7	14	None	Ditto	None (?)	None (?)	Absent.
10	19	Congenital syph.	Ditto	None	None	-1.
11	12	None	Ditto	None	None	-2.
13	16	Congenital syph.	Ditto	None	None	Absent.
14	17 (?)	Congenital syph.	Ditto	None	None	Absent.
22	12	Congenital syph.	Ditto	None	None	-1.
25	8	Congenital syph.	Ditto	None	None	Absent.
28	19	Congenital syph.	Ditto	None	None	-1.
29	8	Congenital syph.	Ditto	None	None	Absent.
34	14 (?)	Congenital syph.	Ditto	None	None	Absent.
37	11	Congenital syph.	Ditto	None	None	-1.
40	10	Congenital syph.	Ditto	None	None	Absent.
44	15	Congenital syph.	Normal	None	None	-2.
45	14 (?)	Congenital syph.	Unable to test	None	Meningitis (?)	-1.
47	32	Congenital syph.	Ditto	None	None	Absent.
51	17	None Congenital syph.	Normal Unable to test	None None	None None	-1.

the absent knee phenomenon. In the next column there is noted but one instance, No. 44, of other diseases of the nervous system which might bring about a diminished knee-jerk.

Beyond an empirical collection of the above facts the writers do not set forth any theory to account for the diminution or absence of the patellar reflex in cases of interstitial keratitis. To do that would involve the discussion of questions far removed from the province of ophthalmology.

In what percentage of healthy people is the knee-jerk absent? Is that absence a congenital defect, or is it a sort of nervous habit acquired in after years? * Regarding even the nature of the phenomenon comparatively little is as yet known, and it seems unwise to assume a new cause as operative while the character of the reaction is yet a matter of speculation. Probably as much as can be safely said about it has already been stated by Waller; † "I am led to doubt," he says, "the now generally accepted theory that the reaction known as (patellar) tendon-reflex is subserved by spinal nervous arcs; while I admit as their highly probable *sine quâ non* the reflex tonicity exerted by the spinal cord. The fact remains constant that spinal conditions, by some influence, be it mediate or immediate, modify the response of muscle to external vibration." On the other hand, this paper makes no claim to having decided many important questions in this connection. The comparatively small number of cases examined, and the short length of time they were under observation, render that impossible. What effect, if any, has the local eye disease upon the knee-jerk? What part does syphilis, for example, play in producing absence or diminution of patellar reflex? Is this subnormal condition one of the late manifestations of hereditary syphilis

* In a note to one of the writers, Dr. Gowers states that in his opinion the knee-jerk is never absent in healthy people.

† "Brain," vol. iii, p. 191.

without obvious disease of the posterior columns of the cord? It is at once apparent that not only a much longer period of time, but a much larger number of cases, will be required to furnish a satisfactory reply to questions of this sort. In the meantime the writers claim to have shown—

1. That in about 30 per cent. of all cases of interstitial keratitis the knee-jerk is decidedly subnormal.

2. That in about 10 per cent. of all cases it is entirely absent—all known causes of subnormal tendon-reflexes, outside of the constant fact that the local eye disease exists, having been eliminated.

3. It is probable also that in a very small percentage of cases of diminished and absent knee-jerks the usual constitutional dyscrasiæ cannot be demonstrated.

4. That it is rare to find a case of exaggerated patellar tendon-reflex in interstitial keratitis when unaccompanied by some of the affections known to produce the former.

THE ASTHENOPIA OF NEURASTHENICS.

By W. J. COLLINS, M.S., M.D., B.Sc. (Lond.).

THE term asthenopia, like similar terms framed upon the same pattern, is liable to a vast amount of abuse. It is often sufficiently mysterious to mislead, and sufficiently ambiguous to fail to explain. It was the refuge of the destitute before the time of Donders; it was the *hebetudo visus* of Jüngken, the *disposition à la fatigue des yeux* of Bonnet; indeed, the names by which its true nature was successfully obscured were legion. Donders showed that "hypermetropia is usually at the bottom of asthenopia," he went further and declared that "in the pure form of asthenopia hypermetropia is scarcely ever wanting;" doubts to the contrary he silenced by demonstrating a latent hypermetropia where the manifest alone had been sought for and not found. Whether accommodative asthenopia (for I do not refer to retinal or convergent asthenopia) does not unfrequently exist without attendant hypermetropia is a question which Donders would apparently have answered in the negative. Yet on p. 593 of his work, in speaking of paresis of accommodation, he says, under these circumstances "the emmetrope complains of fatigue on tension for near objects," and adds that asthenopia quickly occurs.

I venture to think that varying degrees of accommodative asthenopia, due to cycloparesis, are far more common than are generally supposed, more especially in that class of persons whom modern medical nomenclature affects to designate as neurasthenics. Persons of either sex of less than middle age constantly present themselves at clinics and in private practice, whose complaints of asthenopia are both bitter and persistent. In such hypermetropia may have been sought for and only a small defect dis-

covered and accurately corrected, or none is present, or a slight astigmatism is neutralised with appropriate cylinders estimated by retinoscopy after dilatation of the pupils. Reading, even of J. i. at from 20 to 30 cm., may be effected, at any rate for the short space of time which is usually made to suffice for an ordinary trial. Yet the symptoms remain unrelieved and prolonged close work is impossible, so great is the discomfort. Such patients, though often exhibiting wide diversities of individuality, yet fall into the same class; they have been overtaxed, mentally or physically or both; a prolonged course of study, the wear and tear of nursing, a lavish expenditure of the midnight oil, whether in work or otherwise, have often precipitated if they have not occasioned the visual trouble.

Weir Mitchell, in his valuable little book on "Fat and Blood and how to make them" (page 125), has faithfully described the class of case I am endeavouring to depict; he says: "Fatigue of vision for near work is a common condition of the cases I am now describing, and is apt to persist long after all other troubles have vanished. When there is no asthenopia I usually think well of the general chance of recovery; but in no case of feeble vision do I omit at some period of the treatment to have the optical apparatus of the eye looked at with care, because pure asthenopia, apart from all optical defects, is a somewhat rare symptom. Neither am I always satisfied with the ophthalmologist's dictum that there is a defect so slight as to need no correction, being well aware that even minute ocular defects are competent mischief-makers when the brain becomes what I may permit myself, using the photographer's language, to call 'sensitized by disease.'"

If the asthenopia of neurasthenics were based merely upon subjective symptoms and complaints a large element of uncertainty would undoubtedly attach to the existence and true nature of such cases, but the amplitude of accommodation, in any given case, can after the determination

and correction of any static or refractive defect be determined with tolerable accuracy by ascertaining the strongest concave glass which the individual can neutralise. Landolt* says "the strongest negative lens through which an emmetropic eye can yet see clearly at a great distance measures the amplitude of its accommodation. An emmetropic eye which can overcome a No. 11 concave in working at a distance has an amplitude of accommodation of 11 D., and its punctum proximum is situated $\frac{100}{11} = 9$ cm. in front of the eye, since the concave lens causes parallel rays to diverge as if they came from its focus (9 cm. behind it)."

Now the amplitude of accommodation at 10 is 14 D., at 20 10 D., at 30 7 D., at 40 4.5 D., at 50 2.5 D., at 60, 1 D.; so that if after ascertaining and correcting any static (spherical or meridional) defect the available accommodation falls short of that indicative of the age of the patient, we are dealing with so much cyclo-paresis, an efficient cause of asthenopia prior to the onset of presbyopia, and after due correction of hypermetropia manifest or latent.

A few cases from my note-book will illustrate the same in a more concrete fashion.

A. R., æt. 32; has had several children; aborted nine months ago at three months of pregnancy; since then has been delicate, and suffers from asthenopia. V. = $\frac{6}{9}$ each eye, and worse with weakest + glass. Cannot read small print or sew. With +3 D. reads J. i. easily. Cannot see $\frac{6}{60}$ c -3 D.

T. A. C., æt. 29, a gentleman in delicate health, but with no definite symptoms, except that he cannot read by artificial light, and reading "*The Times*" by daylight gives him pain. V. $\frac{6}{6}$ with each eye, and with +.5 D. can just see the letters of $\frac{6}{6}$.

* Landolt: "Examination des Yeux," 1879, p. 128.

He cannot read J. i at less than 35 c.m. without great effort. With -4 D. can hardly see $\frac{6}{9}$, and that only for a few seconds.

M. A. B., a lady's maid, æt. 24, looks delicate and anæmic, has had weak + spherico-cylinders ordered by another surgeon, which accurately correct the whole of her ametropia, yet she has experienced scarcely any relief from their use, and suffers intensely when she does any needlework for more than half-an-hour. Although at her age she should possess 8 D. or 9 D. of accommodation, she can only with great effort neutralise -4 D.

Miss R., a lady help, æt. 22. Has lost flesh of late, is pale and breathless, suffers from menorrhagia with only a fortnight's interval. Complains bitterly of the eyes aching on the slightest exertion. She was under the impression her spine was weak, but nothing abnormal could be discovered there. V. $\frac{6}{9}$, improved by $+1$ D.; no astigmatism by retinoscopy. With $+1$ D. she could not read J. i nearer than 35 cm. She underwent Weir Mitchell treatment for five weeks, viz., seclusion, over-feeding, rest and massage, with result that she gained $8\frac{3}{4}$ lbs., and the asthenopia disappeared.

In rare cases the defect is unilateral; I have only met with one instance, that of Miss W., aged 40, a governess, single. She had had "gastric fever" six months previously; laid up several weeks. Complained of recently acquired asthenopia, especially of the left eye. Catamenia irregular, occasionally misses a period. V. right eye = $\frac{6}{9}$; left eye = $\frac{6}{12}$; not so good with $+.50$ D. With right eye reads J. i at 22 cm.: with left eye can only read J. 6, but with $+2$ D. reads J. i., and ten minutes after the instillation of eserine she can do the same without assistance.

In an earlier volume of these *Reports** I have referred to that variety of cycloplegia or cyclopareisis, which is by no means rare, though often overlooked in women during

* Vol. xi, part iii, p. 347.

the puerperium and lactation. Paralysis of the ciliary muscle after diphtheria is so well recognised, although it was first mentioned by Trousseau and Bretonneau so recently as 1860, and soon after elucidated by Donders, that it only requires passing mention.

The failure of accommodative power, after diphtheria, in the puerperal state, or in association with miscarriage or disturbed menstruation, and also that to which I desire to draw more particular attention, the asthenopia of neurasthenics, I take to belong to the same category. In all there is a faulty blood-metabolism and consequent neuromuscular debility, and it would seem that unstriped muscle suffers seriously from such defective hæmopoiesis, the heart and arterial muscles exhibit lack of tone, the pulse is soft, often irregular, and palpitation is common; the muscular fibre of the intestines suffers, and chronic constipation is a frequent concomitant; the ciliary muscle, with or without associated affection of the iris, is similarly weakened, and the amplitude of accommodation is seriously restricted. The treatment of such cases is happily hopeful and uniformly successful; that which is general is most important; and if the health has seriously suffered, as is generally the case, and emaciation has been going on, the systematic treatment which Weir Mitchell has taught, is, I am satisfied, of paramount value. For the eyes themselves I give weak eserine drops (half a grain to the ounce); insist upon entire abstinence from all close work; and when the general health begins to improve, allow reading or work for a definitely limited period daily with progressively weaker convex glasses, and later stimulate the ciliary muscle by the gymnastic exercise of overcoming progressively increasing strengths of concave glasses. The latter, of course, are not to be used as spectacles, but a 6, 7, or 8 D. concave is carried in the pocket, and distant objects occasionally focussed through it. The ammoniated citrate of iron with the addition of strychnine seems to accelerate the cure.

A FURTHER NOTE ON CASES OF ORBITAL SARCOMA IN CHILDREN.

By J. B. LAWFORD,

Clinical Assistant to the Hospital.

AT page 43 of this volume will be found a short report of four cases of orbital sarcoma in children. When those notes were written, three of the four patients were alive and well, one case (No. IV) had terminated fatally. In the twelve months following the publication of my notes, two more of the patients have died, and it seems worth while now to complete these cases, and to record the condition of the survivor up to a recent date.

CASE I.—Percy N——. Primary growth removed by Mr. Tweedy, November 20, 1885. The former account carries us to December, 1887, shortly after the recurring growth had been removed for the sixth time.

In June, 1888, another mass of tumour was removed by Mr. Doyne, who sent it to me for examination. Its microscopical characters were similar to those of the portion removed in the previous December (*vide* p. 45).

Recurrence again took place, and on December 13, 1888, I had an opportunity, through Mr. Doyne's kindness, of seeing the child. There was then a large hard tumour filling the outer part of the left orbit; it was quite fixed, and protruded the skin over it, in which were large dilated veins. There was no tenderness, no swelling of frontal bone, no fulness of temporal fossa. The child had had, a short time previously, severe headache with vomiting, lasting for some days, but when I saw him was quite well and free from any cerebral symptoms. In January, 1889, headache again came on, followed by loss of consciousness, and irregular movements of the right leg and arm, and the child died in coma on the 25th. Unfortunately, no post-mortem examination was permitted.

This case is remarkable for its long duration, a period

of rather more than five years having elapsed since proptosis was first noticed by the parents, and of over three years since the first removal of the tumour. It is also noticeable that the malignancy of the tumour showed itself, till within two months of the patient's death, by purely local recurrences. In this feature it contrasts strongly with Case IV (p. 48).

CASE II.—Rebecca W——. This patient was seen in the last week of February, 1889. She was then (15 months after the second operation) in good health, and there was no sign of recurrence of the orbital growth.

CASE III.—O. J. The latest note in the previous account of this case, made in January, 1888 (p. 48), is to the effect that no recurrence of the tumour had taken place.

Very soon after this, however (the exact date is uncertain), recurrent growth manifested itself, and on April 21, 1888, the child was admitted to the Middlesex Hospital under Mr. Lang's care. Cerebral symptoms soon developed, and death supervened on May 27, 1888.

The following is a brief abstract from the post-mortem notes:—

The right orbit is completely filled by a soft vascular growth, from the anterior part of which a pedunculated mass, the size of an orange, projects between the eyelids. The growth has partially destroyed the outer and inner walls of the orbit, and has extended into the nasal and temporal fossæ, as well as into the left orbit, and over a large part of the anterior and middle cranial fossæ. No trace of secondary growth in the thoracic or abdominal viscera.

I am indebted to Mr. Lang for the further history of Cases II and III.

REPORTS OF CASES.

By T. PHILLIPS,

Clinical Assistant to the Hospital.

FOR permission to publish the following cases I am indebted to Mr. Tweedy.

I. *Protracted Convalescence after Optic Neuritis.*

B. H., aged 18, came to Moorfields under Mr. Tweedy, two years ago, with very bad diffused phlyctenular ulceration of both corneæ. She had had chicken pox, mumps, and scarlet fever. Father living and well. Mother died of phthisis when B. was an infant.

Treated with iron and cod-liver oil internally. Boracic lotion and atropine locally. The cornea got rapidly better and cleared almost completely, when it was noticed that there was some uvea on the anterior capsule of the lens.

An ophthalmoscopic examination was made about three months afterwards, and it was found that she had marked optic neuritis of both eyes; V. = R. $\frac{20}{70}$; L. $\frac{20}{50}$. She was ordered

grs. v of iodide of potassium three times a day in addition to the iron and cod-liver oil. A fortnight afterwards the condition of the eyes, both as regards vision and ophthalmoscopic appearances, showed no change: two grains more of the iodide were added. In a fortnight she came again, the vision of the

right eye having improved, V. being now $\frac{20}{20}$: no change in the left. The ophthalmoscopic appearances of both were the same as on the previous visit. A month afterwards she came saying that she was much better. The neuritis had nearly all disappeared, with the exception of parts corresponding to where the vessels cross the margin of the disc: V. = $\frac{20}{30}$ in both eyes. A

month afterwards she was able to pick out letters of $\frac{20}{20}$.

About a fortnight later she came saying she was quite well; the disc and fundus looked healthy in both eyes. She was getting tired of medicine and was allowed to go without. She

returned in three weeks saying she could not see so well; $V. = \frac{20}{40}$ in each; the discs appeared œdematous, the upper and lower margins being decidedly blurred. She did not look so well and had lost flesh. Recourse was again had to the iodide of potassium and cod-liver oil, with the application of blisters to each temple. She came back in a week saying she could see much better, $V. = \frac{20}{30}$; in another fortnight she appeared again to be quite well, but the treatment was strictly followed for nearly three months; when she was again allowed to try without medicine. She returned again in a little over a month, saying she could not see so well, $V. = \frac{20}{30}$ in each. Discs looked hazy and had the appearance of being seen through a clear fluid; this was thought to be exudation. The same treatment was applied again. Having spoken of the case to Mr. Gunn, he expressed a wish to see it, and when he examined her he pronounced the disc and fundus normal, and, in order to test the case, treatment was suspended for six weeks, when she came complaining of the sight being not so good. Mr. Gunn again saw her and pronounced the discs slightly blurred, and the adjoining retina œdematous looking. July 26, 1889. She is now improving once more under the above treatment.

II. *Right Lateral Hemianopsia after Injury.*

H. R., aged 34, labourer, came complaining of bad sight since an accident five months ago, when a piece of iron fell on his head. There was no open wound. He was unconscious for three weeks. Soon after he recovered consciousness he noticed that he could not see very well. $V. = \frac{20}{200}$. He is "no scholar" and cannot pick out any letters of Jaeger's test types. Refraction normal. There was a marked depressed fracture of the skull just below the posterior superior angle of the left parietal bone. The ophthalmoscope revealed no gross change except that the veins were a trifle fuller and more tortuous than ordinary.

The accompanying perimetric charts will show the condition of the field of vision in both eyes.



CURATOR'S PATHOLOGICAL NOTES.

By E. TREACHER COLLINS,

*Curator of the Museum.*I. *Dragging forwards of the Retina in the Region of the Ora Serrata without General Detachment.*

IN two of the following cases the eye was lost as the result of ophthalmia neonatorum. The following series of events, which is applicable to both, had occurred. The cornea sloughed, and the greater portion of the lens escaped. The false cornea which formed became staphylomatous. The iris and what was left of the lens and its capsule adhered intimately to this pseudo-cornea. This advanced attachment of the lens capsule, and the bulging forwards of the cornea, caused a considerable drag on the suspensory ligament of the lens, and on the structures into which it is inserted. Thus the ciliary processes became elongated. The most of this drag, however, would be felt by those parts to which the posterior fibres of the ligament are attached, viz., the *pars ciliaris retinæ* and the *ora serrata* of the retina. The former being firmly adherent to the ciliary body was not detached; the latter, however, became prolonged forwards in the form of a fold, thus covering over the ciliary processes and the *pars ciliaris retinæ*. In one of the cases also the retinal pigment layer became projected forwards and inwards for a short distance.

In the third case a similar result as to the dragging forwards of the retina was brought about in a different way. There had been a penetrating wound in the ciliary region which had passed through the suspensory ligament of the lens on one side, and also wounded the lens itself; absorption of the greater portion of it followed; a band of

cicatricial tissue formed in the track of the wound, the contraction of which, together with the shrinking of the lens, produced the drag on the suspensory ligament and a localized prolongation forwards of the retina.

These cases are interesting in demonstrating how an extension forwards of the retina can take place in this way without, or, in one case, with one slight detachment elsewhere; they also show how firm an insertion the suspensory ligament must have into the ora serrata, and how unyielding a structure is the pars ciliaris retinæ compared with the retina itself.

CASE 1 (Reg. No. 2726).

Henry D—, æt. 4, was admitted on October 23, 1888, with a history of having had ophthalmia neonatorum, and of the lens of his right eye having dropped out into the mother's hand when he was a few days old. The cornea of his right eye was opaque, vascular, and very staphylomatous, the most marked bulging being at the lower and outer part. T. n.

The right eye was excised the following day.

Pathological Report. Macroscopical Examination.—The antero-posterior diameter measured 29 mm. and the transverse 12 mm. *Cornea* was much enlarged, and presented very different degrees of thickness; in the centre it measured 2.5 mm., and gradually tapered off on either side, but more above than below. *Iris*: the uveal pigment layer was spread out in the form of a network, and was intimately adherent to the posterior surface of the cornea. In many places it projected backwards in the form of pleats, and in the centre formed an irregular thickened stellate mass. *Lens*: to the apex of this stellate mass was attached a small triangular piece of white thickened membrane, from which several tags passed backwards. The *retina* from the region of the ora serrata was prolonged forwards, and was attached to the tags above-mentioned, thus overlying the ciliary processes. The remainder of the retina was *in situ*. The *choroid* was apparently normal. *Optic nerve* cupped.

Microscopical Examination.—The cornea is composed of irregular bundles of fibrous tissue, between which several patches of small round cells are placed. These are more

numerous between the anterior layers. No trace of Descemet's membrane can be distinguished. The posterior surface of the cornea is lined by the pigment epithelium of the iris. None of the other layers of the iris remain. At one part of the posterior surface of the cornea there is a break in the continuity of this pigment layer, and some fibrous tissue passes backwards from it, of which the triangular piece of membrane before mentioned is composed. Adherent to this fibrous tissue, and passing backwards from it, are the fibres of the suspensory ligament of the lens. These can be traced to their insertion into the ciliary processes and the ora serrata. The former are very much atrophied, stretched, and drawn forwards. The retina, which projects at the region of the ora serrata, and which overlies the pars ciliaris retinæ, is composed of a delicate network of fibres with fine branching cells and some scattered nuclear bodies. Behind the ora serrata there are several large colloid excrescences springing from the lamina vitrea of the choroid, with some disturbance of the retinal pigment overlying them.

CASE 2 (Reg. No. 2759).

Boyton, M., æt. 15, on December 19, 1888, had his right eye, which was blind and staphylomatous from ophthalmia neonatorum, excised by Mr. Tweedy.

Pathological Report. Macroscopical Examination.—T. was +2. The staphyloma involved the entire anterior third of the globe. The *cornea* was densely leucomatous, except at the extreme margin on each side; it was much thinned.

Iris.—Pigment layer the only part that could be distinguished, and this intimately adherent to the cornea.

Lens.—A small circular body about the size of a pin's head, also attached to the cornea, was all that remained of it.

Retina.—The teeth of the ora serrata, much elongated, were continuous by fine processes with this remnant of the lens. The indentations between the teeth were very deep. This anterior portion of the retina was overlying the ciliary body and pars ciliaris retinæ. At the posterior border of the pars ciliaris retinæ a pale line could be seen, and behind it several pigmented spots. The remainder of the retina was everywhere *in situ*.

The *choroid* had several atrophic patches with pigmented margins in it. *Optic nerve* apparently healthy.

Microscopical Examination.—The cornea is covered by a laminated epithelium, the bases of the deepest cells of which form a very irregular line. It is composed of irregular bundles of fibrous tissue, with scattered small round cells between them. The pigment layer of the iris lines the posterior surface of the cornea, thus causing obliteration of the anterior chamber, except at one angle, where Descemet's membrane with its lining epithelium can be seen, and where the iris is of its normal thickness. In the centre of the cornea there is a break in the pigment layer of the iris which lines it, in which is situated an irregular network of fibres, and from this proceeds backwards the fibres of the suspensory ligament of the lens. The most anterior of these pass to their insertion into the pars ciliaris retinae and ciliary processes, which latter are much elongated. The posterior are attached to a process of tissue lying internal to the ciliary processes, which is composed of branching cells and fibres supporting numerous nuclear bodies. This tissue is continuous with the retina at the posterior margin of the pars ciliaris retinae. A fold also of the pigment layer of the retina projects forwards and inwards in this region for a short distance, with some colloid material around it. The ciliary muscle is very much atrophied and elongated. The choroid has numerous colloid excrescences springing from its elastic lamina, and causing considerable disturbance of the retinal pigment.

CASE 3 (Reg. No. 2767).

Charles H., æt. 15, admitted under Mr. Hulke on January 9th, 1889. Twelve years ago his right eye was struck with a piece of broken glass. It has been blind since then. A month ago it became painful, and for the last fortnight he has had pain in the left eye also.

On admission: R.E. Cornea much bulged, with a scar on the outer side, extending into the ciliary region; anterior chamber shallow. Iris adherent to the scar. T.+l. No p. l.

L.E. Pupil active; no changes in fundus. T. n. $V. = \frac{6}{12}$.

Hypermetropic.

Pathological Examination. Right.—T.+l. Antero-posterior diameter measures 27 mm., and lateral, 25 mm. The anterior portion of the globe is staphylomatous; there is a

linear scar extending into the ciliary region, and running up and out in the cornea; there are also some small dotted opacities around this, and there is an anterior synechia, as above mentioned.

Examination of a section of the eyeball after hardening shows the iris drawn forwards by the adhesion, but the angle of the chamber apparently not narrowed. The lens is much shrunken and opaque. The retina in the outer half is detached in the form of a ruck; in the region of the ora serrata, at the upper part of the eyeball, it passes forwards, covering over the ciliary processes. The choroid has several atrophic patches in it, around which there is an increase of pigmentation. The optic nerve is deeply cupped, and the cup has a very abrupt margin.

Microscopical examination of sections of the eyeball through that portion where the retina passes forwards over the ciliary body shows that the wound in this region has perforated at the junction of the root of the iris with the ciliary body. The capsule of the lens is thrown into numerous folds, and has a small quantity of degenerated lens substance within it. Behind this is a mass of fibrous tissue continuous with the inner part of that forming the cicatrix of the wound. Adherent to this fibrous mass is a process of tissue composed of a fine network of fibres and nuclear bodies, which is prolonged from the ora serrata, and overlies the pars ciliaris retinae. At the situation of the ora serrata the pigment layer of the retina is prolonged for a short distance into the projecting process, and is considerably thickened. In the retina itself, behind the ora serrata, the fibrous elements are increased, and they form a network with small spaces left in it. In this region also there are several nodules of colloid substance sprouting from the elastic lamina of the choroid, causing considerable disturbance in the pigment layer of the retina by its upheaval.

II. *Three Cases in which a Foreign Body, after entering the Eye, rebounded from the back of the Globe.*

The first two cases related below were injured by pieces of steel, and there was, when the patients first pre-

sented themselves, much doubt as to whether or not the foreign body was retained within the eye. In the first case, where the lens was unwounded, two separate white patches could be seen in the fundus. It seemed likely that one, the smaller and more anterior, was the place of entrance, and the other the place of exit of a foreign body, it having passed right through the eye. It was only on examining the eye, after removal, that the nature of these patches became evident. The smaller patch corresponded with an external scar; the foreign body entering here struck the back of the globe in the position of the larger patch, without, however, sufficient force to perforate its coats. It then rebounded and came to lie on the ciliary body at the lower part of the eyeball, the rebound probably being assisted by the resistance of the unyielding walls of the orbit, felt through the intervening soft structures.

In Case 2 the foreign body, after having passed through the cornea and lens, must have struck the back portion of the outer half of the globe, where was situated a white patch in the choroid, very similar in appearance to the larger white patch in Case 1; from here it rebounded, and finally rested on the lower part of the ciliary body.

In Case 3 the injury was from a shot, and its track could be traced through the cornea, iris, and lens, into the vitreous, in which a band covered with hæmorrhage passed between the posterior surface of the lens and retina, where there was a hole, and from which the shot must have rebounded into the anterior portion of the vitreous, where it was found. That the shot must have struck the back of the globe with considerable force is rendered probable from the fact that the shot was facettèd. There was no reason to think it was a glance shot which had rebounded from some object previous to entering the eye.

CASE 1 (Reg. No. 2692).—James W., æt. 42, came to Mr

Nettleship as an out-patient on August 20th, 1887, having on May 27 of the same year had his right eye struck by a chip of iron about the size of a pea. Ever since then he had had photopsiæ (blue flashes).

On examination of the right eye it was found the pupil was fixed = 6 mm., T. n.; V. not = $\frac{6}{60}$ J. 18; H. 5 D. = $\frac{6}{12}$ c + 8 J. 2.

No evidence of any external wound could be discovered, while in the nasal half of the fundus two large areas of disease could be seen. Mr. Nettleship noted that the largest area which consisted of exposed sclerotic, with retinal vessels running over it, looked as if it might have been a counter wound. The other was a mottled grey patch, bordered by bright yellowish white, apparently deposit; there was faint white tracing in the retina and vitreous around.

In his left eye V. = $\frac{6}{9}$. Hm. 3 = $\frac{6}{6}$.

On October 5 it was noted that a nearly obliterated vessel, artery or vein, runs straight from o. d. to the lower patch, which is unaltered and probably retinal.

On August 25, 1888, he came with an acute attack of iritis and conjunctivitis in his right eye, which had commenced four days previously. The pupil was small, irregular, and immobile; it dilated very imperfectly after the use of a strong solution of atropine (4 grains to the ounce). Three days later the eye had not improved; the T. was slightly —, and the fundus could not be seen. He then for the first time stated that the chip that struck him made a red mark on the white of the eye.

The eye was excised on September 1.

On examination after removal it was found that the tension was normal. There was a nebula running in the form of a line vertically upwards and outwards, in the outer third of the cornea. Beneath the lower border of the internal rectus was a small horizontal scar about 2 mm. in length. There were three posterior synchiæ down and in, and a patch of uveal pigment on the anterior capsule of the lens.

After being hardened in Müller's fluid and frozen, an antero-posterior vertical section was made. In the inner half of the eyeball, at a point corresponding to the scar described externally

at the lower border of the internal rectus, was a small white spot, in the neighbourhood of which the retina was puckered, and the tunics of the globe were adherent. From this spot, running backwards and slightly upwards, was a fold in the retina, which terminated in a larger white patch, which had a pigmented margin and in the centre a slight depression. This patch was situated upwards and outwards from the optic disc. In the same half of the eyeball, lying on the ciliary body at the lower part, and just behind the lower margin of the lens, was a piece of steel covered by some white flaky substance, and measuring about 3 mm. in length by 1 mm. in breadth. The anterior chamber was shallow.

CASE 2 (Reg. No. 2722).—Isaac S, æt. 17, came to Mr. Couper as an out-patient on December 6, 1887. He had been recently struck on his right eye by a piece of steel, the size of which he did not know.

There was a jagged wound in the centre of his cornea, a wound of the lens, and what appeared to be some air bubbles in the upper part of the anterior chamber; T. was —; there was no entanglement of iris. An incision was made upwards in the cornea, and a piece of iris removed, some vitreous escaping. The eye continued to be painful and irritable at times, and on November 1, 1888, he complained of his left eye aching also. At that time the a. c. of the right was full of blood-stained fluid, so that the iris could not be seen, and he had no perception of light with it. It was excised the following day.

Pathological Examination. Right Eye.—T. n., general haze of cornea. Scar of operation at upper part of cornea. Scar of wound in upper and outer third of cornea. Coloboma upwards, with a yellow opaque membrane in the lower part of it. There is also a yellow mass in the upper part of the anterior chamber. The aqueous is discoloured. *After section of the globe.* The lens is absent, its capsule and an inflammatory membrane are adherent to the scar in the cornea. The vitreous is shrunken and detached from the retina below. In the outer half of the globe is a circular white patch in the choroid, where the tunics of the eye are adherent. In the lower part of the eyeball, behind the iris and lens capsule, lying on the ciliary processes, is a small piece of steel.

Case 3 (Reg. No. 2905).—Frank B., æt. 21, was shot in his left eye on July 7, 1889, two days previous to his admission into the hospital under Mr. Lawson. The person who shot him was standing at a distance of 15 yards when he fired. He believes only one pellet entered the eye.

The left eye on examination was found to have a wound in the centre of the outer half the cornea. There was a hole in the outer half of the iris corresponding to this wound, and some opacity of the lens on its outer side and at the posterior pole. There was general injection of the eye. No reflex could be obtained from the fundus. $V. = \frac{6}{18}$ partly, T. —1. The eye was excised on July 9, 1889.

Pathological Examination.—A wound penetrating the outer half of the cornea and iris was found as above described. The lens was shrunk, especially the outer part; from its posterior surface, passing through the vitreous to the retina just below the yellow spot, was a narrow band covered with hæmorrhage. In the retina where this band joined it was a small starred rent; there was no opening in the sclerotic externally corresponding to this. The vitreous contained a quantity of recent blood clot in its outer part, and in its anterior part, just posterior to the lens, a shot was found. This shot was faceted on the surface.

III. *Hernia of the Lens through a Perforation in the Cornea.*

In both of the cases detailed below there was ulceration of the cornea; in one the ulcer had perforated, in the other a Saemisch's section had been made across the base of the ulcer. In both a portion of the lens protruded through the perforation in the cornea without any rupture of its capsule.

On examining the first of these eyes directly after removal, a clear projecting spot was seen in the centre of an opaque cornea. It presented just the appearance of an ulcer which had extended down to Descemet's membrane, and where that membrane had become bulged forwards into its base, and I took that to be the condition of things until after the eye was opened.

It is remarkable that in both cases it occurred in elderly patients, and it shows how elastic a structure the lens is even in advanced life. It is possible the projection of the lens was to some extent increased by the pressing forwards of the eyeball to divide the optic nerve during removal.

CASE 1 (Reg. No. 2702).—George W——, æt. 68, was admitted under Mr. Lawson on September 13, 1888. He stated the sight of his right eye had been defective all his life, that for some time past he had had a discharge from his nose, and that four months ago a piece of diseased bone was removed from it at St. Bartholomew's Hospital. He thinks the discharge from his nose affected his right eye, which had been inflamed the last six months. He had no perception of light in it. It was excised the following day.

Macroscopical Examination.—Cornea was much flattened, and on section appeared quite straight. It was opaque and vascular, and there was a central perforation through which a clear body projected. Iris passed into the perforation. The clear projecting body mentioned above on section was found to be a portion of the lens. Vitreous turbid. Retina and choroid *in situ*, and apparently healthy.

Microscopical Examination.—The whole of the anterior layers of the cornea are extensively infiltrated with small round cells, and numerous blood-vessels course through them. At the seat of perforation the infiltration extends throughout all its layers. Descemet's membrane on each side is much wrinkled. The free extremity of the iris on each side turns round the edge of the perforation in the cornea, and here its anterior layers are atrophied. The projecting portion of the lens is derived entirely from the cortical part, and is composed of fibres very irregularly curved and folded. The fibres forming the nucleus are not the least bent opposite the perforation. There are several groups of small circular globules in the cortical part. The capsule is quite intact. The retina has some cystic spaces in it, immediately posterior to the ora serrata.

CASE 2 (Reg. No. 2776).—John S——, æt. 79, came to Mr. Tay as an out-patient on January 14, 1889, with a central ulcer of his left cornea. There was considerable chemosis of the con-

junctiva, and some regurgitation from the lacrymal sac. There was no history of any injury to the eye, or of any definite cause for the ulceration.

On January 17, hypopyon had formed. He was admitted into the hospital on January 21, when a Saemisch's section was made through the ulcer, the hypopyon evacuated, and the galvano-cautery applied to the margins of the ulcer. On January 24, the ulceration having extended, the eye was removed.

Macroscopical Examination.—Cornea opaque, with extensive central ulceration, and a perforation through which appeared a central clear nodule, which was level with its surface. Iris pushed forward into contact with the posterior surface of the cornea. Lens projected into the perforation of the cornea. The choroid in its lower part, just behind the situation of the ora serrata, contained an atrophic patch, where it was adherent to the retina. Around this was some scattered pigmentation. Retina *in situ*.

Microscopical Examination.—On each side of the perforation in the cornea the superficial epithelium is absent, and there is considerable small cell infiltration between the layers of fibrous tissue. Descemet's membrane is wrinkled. Iris and ciliary body much thickened by infiltration of small round cells. Free margin of iris on one side turns round the edge of the perforation and projects through it, and on the other, the cornea turns round the free margin of the iris and projects inwards. At the periphery on one side the iris is adherent by inflammatory exudation to the posterior surface of the cornea for a short distance, not, however, blocking the angle of the anterior chamber. The central layers of the lens are not bent where it is bulged forwards. In the cortical part there are many different sized globules and irregularly shaped masses. The projecting portion is granular, and has no well-defined laminated arrangement; it seems to be produced entirely by the cortical parts. There is no break in the capsule covering it. The vitreous has some small cell infiltration in its anterior parts. Immediately posterior to the ora serrata, the retina has several cystic spaces in it and is slightly prolonged forwards.

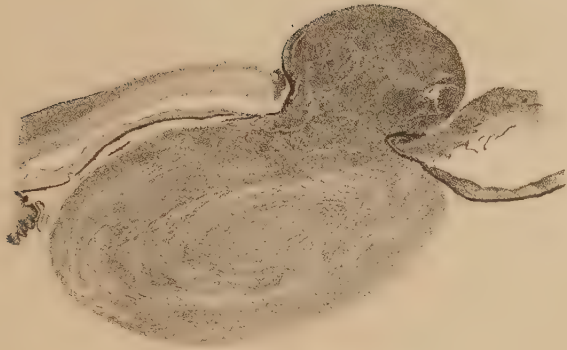


Fig 1.

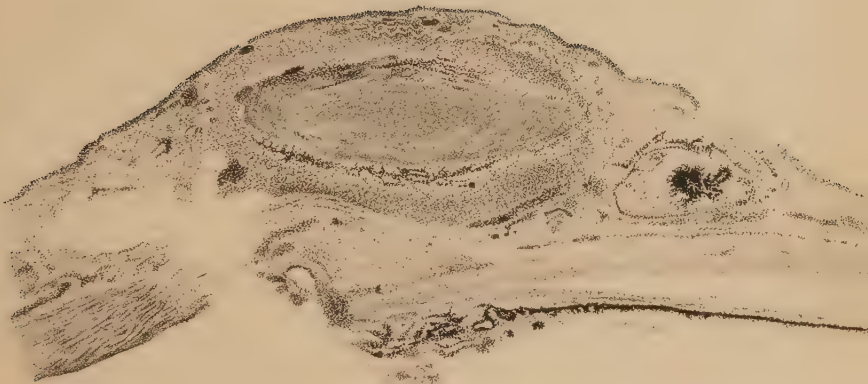


Fig 2

IV. Rupture of the Globe with Displacement of Lens.

Several interesting points are presented in these three cases of rupture of the globe. In the first I was fortunate enough in obtaining a specimen of sub-conjunctival dislocation of the lens, in which the relation of the parts was preserved as they were during life. In this case the whole iris had become detached and expelled from the interior of the eyeball; it lay beneath the conjunctiva, and posterior to the lens. It is usual in cases of this sort to get some displacement of the part of the iris opposite the rupture. This occurred in Case 2, the condition of parts in which may be regarded as a stage through which Case 1 must have passed, for in it the lens was slightly displaced forwards and upwards, the upper part of the iris having been driven in front of it and tucked into the sclerotic. Total detachment of iris, however, appears to be very uncommon. A case has been recorded by Dixon * in which both lens and iris had escaped from the globe and the conjunctiva had been ruptured.

The position of the two layers of the capsule superficial to the lens in Case 1 is difficult to explain.

The third case, for the notes and drawing of which I am indebted to Mr. Doyne, is an example of a very unusual condition, viz., sub-conjunctival dislocation down and out. Dixon, in the paper before referred to, collected 26 cases which had been recorded, and found that not in one was the sclerotic torn below or to the outer side of the cornea. The reason the rupture is so much more frequently upwards, or upwards and inwards, is that it occurs opposite to the position of the blow. The eye being protected on the upper and inner sides by the orbit and nose, the outer and lower parts are the most commonly struck. In this case the blow was said to have struck the eyebrow. Lawson†

* *Lancet*, 1852, p. 486.

† "Injuries of the Eye, Orbit, and Eyelids," p. 202.

relates a case of rupture down and out with the lens displaced subconjunctivally down and in.

Case 2 raises the question of the possibility of sympathetic ophthalmitis occurring without perforation of the external coverings of the globe. The patient was seen for the first time three days after the injury, and no external wound could be found. The examination of the eye after removal did not reveal either to the naked eye or microscopically any evidence of there having been a perforation. On the other hand, ruptures of the conjunctiva are possible in cases of this sort, and conjunctival wounds heal very rapidly with little scarring. It is also just possible the iritis of the other eye may not have been sympathetic, but due to some other cause. It commenced remarkably soon after the injury (18 days) for sympathetic ophthalmitis, though in its appearance and ultimate course it resembled that disease. Whether there was an external wound or not, it shows that cases may present themselves in which no sign of there having been one can be made out, and yet sympathetic ophthalmitis supervene. This case illustrates the necessity of bearing such a contingency in mind in deciding what course of treatment to adopt.

Case 3 shows the result of non-interference with a case of subconjunctivally dislocated lens. Most of the text books recommend that the conjunctiva should be incised over the tumour and the lens removed. The disadvantage of this is that by opening the conjunctiva micro-organisms may gain entrance to the interior of the globe and may give rise to sympathetic ophthalmitis. In some cases it must be performed at once for the relief of pain.

I may sum up then the principles of treatment of ruptured globe which I think are indicated by the following cases as follows:—If the eye is blind it should be excised even though no perforation of the conjunctiva is discovered. If some amount of useful vision is likely to be gained an attempt to save the eye may be made, but a

very careful watch should then be kept on the patient for some considerable time. If the lens is dislocated sub-conjunctivally, and there is much pain, the lens must be removed; if there is no pain and no wound of the conjunctiva it is best left alone, at any rate until the sclerotic wound has healed.

CASE 1 (Register No. 2772). Elizabeth M., æt. 70, was admitted to the hospital under Mr. Silcock, on January 17, 1889. She stated that on December 22nd of the previous year, she struck her left eye against the foot of a chair, since when the sight had been bad and the eye inflamed.

There was general injection and tenderness of the left eye, a rupture of the sclerotic at the upper part, and a steamingness of the cornea. The anterior chamber was full of blood, and beneath the conjunctiva at the upper and outer part, near the margin of the cornea, was a rounded prominence which appeared to be the lens displaced. She only had perception of light with that eye and the T. was full. Her right eye was myopic but otherwise healthy.

On January 18 her left eye was excised, the conjunctiva being cut round behind the dislocated lens.

Pathological Report. Macroscopical Examination.—Antero-posterior diameter measures 30 mm., the vertical and lateral diameter 25 mm. Anterior chamber filled with blood. The sclerotic has a large rupture in it about 18 mm. in length, and running concentric with the corneal margin and about 5 mm. posterior to it. The conjunctiva is continuous over the rupture without any break in its continuity. Lens lies between the conjunctiva and the sclerotic at the upper and outer part of the globe. On section it is seen to be surrounded by a yellowish-white ring. The iris has entirely separated from its attachment, the uveal tracts ending anteriorly at the ciliary processes. Behind the lens, between the conjunctiva and sclerotic, is a small pigmented mass which is probably the displaced iris. The vitreous has the remains of several old hæmorrhages in its anterior part. The retina and choroid *in situ*; the latter has some patches of atrophy in it from stretching. Optic nerve apparently healthy.

Microscopical Examination.—Immediately beneath the con-

conjunctiva over the seat of the rupture is seen the capsule of the lens thrown into numerous folds, its two layers being separated from one another only by some inflammatory leucocytes. They are quite separate from the lens substance, which is situated deeper and surrounded by a mass of round cells. The pigmented mass posterior to the lens is composed of branched pigmented cells and blood-vessels, and also pigmented cells like those on the uveal surface of the iris.

CASE 2 (Register No. 2456).—Rose S—, æt. 56, was struck on her right eye by a fist on October 1, 1887; three days later she attended as an out-patient under Mr. Lawson, and it was noted that she had a ruptured globe, without any apparent external wound of the conjunctiva, no perception of light and T. —1. She was admitted to the hospital on October 25, 1887. She then stated that a week previously, *i.e.*, 18 days after the injury, she noticed for the first time a dimness of sight in her left eye.

Condition on Admission.—*Right eye*: general injection; rupture of sclerotic extending round the upper half of the globe in the posterior part of the ciliary region; no visible perforation in the conjunctiva; haze of the upper part of the cornea; iris drawn up into the rupture so as to simulate a coloboma upwards; opacity at posterior part of lens. A grey reflex only was obtained from the fundus; no p. l.; T. —1. *Left eye*: circumcorneal injection; no keratitis punctata; numerous posterior synechiæ: deposit of lymph on the anterior capsule; V = fingers at 2 feet. T. n.

October 27. Right eye excised.

November 24. Left eye has still considerable injection. No pain. She never had any inflammation or trouble of any sort in this eye previous to the accident. It subsequently became quite blind.

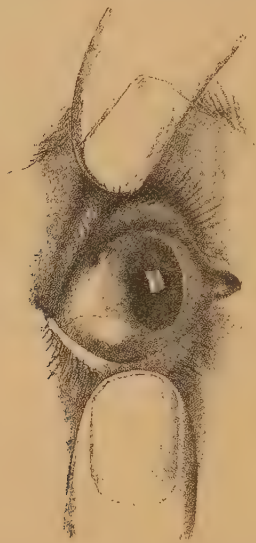
Pathological Examination of the excised Eye (made by Mr. Lawford).—The conjunctiva has been cut far back at the upper part behind the rupture. The rupture of sclera at the upper part is almost concentric with the corneal margin and extends nearly half way round. The conjunctiva is thickened and very vascular, and it extends smoothly over the rupture: there is now no scar in it, and as far as can be made out it has not been

ruptured. The iris at the upper part has disappeared. The cornea is nearly clear; anterior chamber shallow. Optic nerve-sheath is not dilated. Eye opened by an equatorial section; subsequently an antero-posterior section made. Some thin blood-stained fluid escaped. The retina is detached except at the optic disc; it contains some blood clot and remnants of vitreous. Choroid partially detached from the sclerotic by hæmorrhage beneath it. The iris is prolapsed into the rupture, which is just beyond the posterior limit of the cornea. The lens has some patchy opacity on its posterior capsule, and is displaced forwards and upwards. It is of nearly normal shape but a little rounded. It is in contact with the cornea in the upper half, and the iris is jambed between it and the cornea except where it has escaped into the rupture. The ciliary processes are swollen, and close to their lower part there are numerous posterior synechiæ.

Microscopical examination of sections at the seat of the rupture shows the epithelium of the conjunctiva forming an unbroken layer; there is not any scar tissue in the structures immediately beneath it. At the line of rupture there are bundles of fibrous tissue running in various directions with a quantity of small round cell infiltration between and around them. The iris is folded in two in the middle, and drawn into the fibrous tissue at the rupture; it is thickened by infiltration with small round cells in this part, and also at its root opposite the seat of rupture, as also is the ciliary body.

CASE 3.—Catherine W—, aged 63, was in November, 1871, struck on her right eyebrow by a piece of wood, which flew off while she was chopping. She attended at the Moorfields Hospital as an out-patient, under Mr. Critchett and Mr. Couper, on July 23rd, 1872. The note on her out-patient letter of that date states that in her right eye there was, at the lower and outer part, a cicatrix in the sclerotic, half a line from the corneal margin, and a large coloboma of the iris. The lens was displaced, lying beneath the conjunctiva, down and out. The fundus of the eye was quite healthy, and her V. = $\bar{c}$ +11D. $\frac{20}{100}$, and $\bar{c}$ +18 D. J. 19. There was considerable astigmatism, the weakest meridian being in the long axis of the coloboma. No operation was performed.

She was seen by Mr. Doyne (who had the accompanying drawing made of her eye), at the Oxford Eye Hospital, in the



early part of this year, that is, nearly 18 years after the receipt of the injury. The eye had not given her any trouble during that time. All that now remains of the sub-conjunctivally dislocated lens is a small, slightly raised, yellow patch at the lower and outer part of the globe.

A CASE OF DISTENSION OF THE FRONTAL SINUS WITH MUCOUS POLYPI.

By CYRIL H. WALKER,

Senior House Surgeon.

T. L., a shoeblack, aged 18, first came to the Hospital on March 7, 1888, complaining of a painful swelling over the left eye, and was placed under the care of Mr. Hulke. On examination proptosis of the left eye was found, the globe being also pushed a little downwards and outwards. There was a firm swelling to be felt along the upper margin of the orbit, which was tender and the skin over it œdematous. Periostitis of the roof of the orbit was suspected. The swelling had only been noticed a few days, and no history of recent injury was elicited. The patient was a fairly healthy lad; there was no evidence of tubercle, syphilis, or strumous disease. It should be stated that though the patient could give no history of injury at the time, the following facts were afterwards ascertained. There was a small scar over the internal angular process of the frontal bone on the left side. It was not deep, and was stated to have been caused by the patient having fallen against the bars of a grate when he was about three years old. He also said that one or two years previously he had been struck on the left side of the forehead by a board, but there was no evidence of the injury having been severe.

The patient attended once a week until April 18, when it was evident that an abscess had formed in the roof of the orbit and was begining to point just below the outer edge of the left eyebrow. The patient was taken into the hospital; the abscess was opened and a little healthy pus evacuated. The cavity was explored with a probe, but no bare bone could be felt. No inflammation followed, and the wound rapidly healed up though the proptosis continued. A month later the patient attended again, the abscess having in the meantime reformed. It was opened and syringed and again healed up in a few weeks. The vision remained quite good, and no changes could be detected with the ophthalmoscope.

No further trouble was experienced until the beginning of the following October, when again an abscess formed in the same place. An incision was made and much pus evacuated; the sinus continued to discharge freely for some days. For a time the inflammation subsided, but on November 17 there was a fresh accession of inflammation, and for the first time the patient's temperature was found to be raised to 100° F. The incision was freely enlarged and, free exit being given to the discharge, the inflammation and pyrexia rapidly subsided. Examined with a probe the sinus was found to curve round towards the inner side, and a small area of bare bone could be felt in the roof of the orbit near the plate of the ethmoid. On November 28 (more than eight months after the commencement of symptoms) the wound was further explored. An incision was made along the inner end of the palpebral fold to meet the end of a probe passed along the curve of the sinus. A hole was found in the roof of the orbit large enough to admit the tip of the finger. Through this hole a mucous polypus the size of a Barcelona nut protruded. This was removed, as were also some small portions of other similar polypi. Drainage-tubes were inserted and the wound was syringed twice a day with perchloride of mercury lotion.

In the Curator's Report Mr. Treacher Collins gives the following particulars of the mucous polypus:—"A smooth, soft, gelatinous-looking mass 20 mm. long, 13 mm. wide; composed of a quantity of loose mucoid tissue with patches of small round-celled infiltration; the tissue is denser at the periphery than in the central part; the surface is covered with laminated epithelium, the cells being mostly circular or irregularly polyhedral."

The patient went on well till January 6, 1889 (though the drainage of the cavity was not free owing to the viscid nature of the discharge), when he had a succession of rigors followed by pyæmic symptoms. Dusky phlegmonous inflammation spread over the whole of the face and scalp; the discharge from the wound ceased; the temperature repeatedly rose to 104°, and for three weeks he was very ill indeed. About 10 days after the commencement of the attack of pyæmia a double murmur was detected near the heart's apex beat. This was pronounced to be due to aortic and mitral regurgitation, and the patient's

pulse and general symptoms favoured this view, although the diastolic murmur was rough in character and not quite like aortic regurgitation. The urine was tested several times, but no albumen was found nor any signs of nephritis. Ophthalmoscopically no changes could be found. The grave symptoms gradually disappeared, the inflammation subsided, and the sinus began again to discharge healthy pus. The patient was kept in bed until all symptoms of aortic regurgitation had subsided. Various lotions were used to syringe the wound—perchloride of mercury, carbolic acid, boric acid, “salufer” (sodium fluo-silicate), quinine, and iodine. This last was found by far the most effectual, rendering the discharge less abundant and less viscid; but it stained the instruments and linen, and if a drop chanced to run into the eye caused so much irritation that it was abandoned in favour of perchloride of mercury.

April 23. The sinus still discharges viscid purulent matter. To-day, after syringing, another small portion of a polypus came into the orifice of the wound and was removed with forceps. A drainage-tube has been kept in hitherto, but the opening is closing and renders its introduction difficult. The patient is much better in general health, although a little weak.

$$\begin{aligned} \text{V. Right} &= \frac{6}{24} \bar{c} \frac{-3 \text{ D, sph.}}{-1 \text{ cy. ax. vert.}} = \frac{6}{18} \quad \text{V. Left} = \frac{6}{9}; \bar{c} + 1 \\ &= \frac{6}{6}. \end{aligned}$$

July 20. The sinus still discharges a little, but the fluid has become clear, yellowish, and only slightly viscid. There is no pain or tenderness. There is about the same amount of proptosis as when the patient was first seen. The vision still remains good. The pulse is still very irregular, but there is no cardiac bruit, and the patient does not exhibit any symptoms of heart disease. A soft mass can be sometimes felt with a probe, apparently on the roof of the sinus; with this exception there has been no evidence of any more polypi in the sinus. No polypi can either be seen or felt in anterior or posterior nares, nor has the patient ever had any symptoms leading to the supposition that he has polypi anywhere except in the left frontal sinus.

Cases of polypi in the frontal sinuses are certainly not common; and it is apparently very rare indeed to find

polypi affecting the frontal sinus unassociated with polypi in the nose. For this reason the present case seemed worth recording.

As regards the sequence of events in this case, it does not seem very clear whether either of the injuries referred to above caused (indirectly) blocking of the infundibulum with subsequent distension of the sinus (the growth of polypi being favoured by retained secretions); or whether the polypi blocked the infundibulum, and then distension and abscess followed. In support of the former view, the growth of polypi is said to be determined, or at any rate favoured by chronic nasal catarrh, and it would seem natural to suppose that retained secretion would also favour their development. And in connection with this point it may be mentioned that polypi have been found in some cases of "persistent dropping of clear fluid from the nose, accompanied by optic atrophy," a fact which tends to show that they are to some extent dependent on irritative secretions. The length of time that elapsed between the injury and the commencement of the distension cannot be stated even approximately, as the patient had not noticed the prominence of the eye at all, and it may have existed for some years.

Another feature of the case is the site at which the distended sinus pointed; it being far more common for the abscess to point immediately above the inner canthus. The pointing of an orbital abscess at the outer side did not suggest the possibility of any connection with the frontal sinus. If it had been thought advisable to reopen the infundibulum (so as to drain the cavity through the nose), it could not have been as easily accomplished as in most cases, on account of the opening being so far from the middle line.

With regard to the septicæmia which occurred at one stage of the case, it was apparently due to the trivial damage done by probing the cavity which contained at the time a large quantity of pus so viscid and tenacious

that it could not be removed by syringing, and which was not aseptic. A writer in one of the medical journals has recently had similar experience, and advises the precaution of syringing a sinus both before and after exploring it with a probe.

[The subsequent progress of the case would seem to indicate that the double murmur heard over the apex of the heart was pericardial.]

THE DIVISION OF ANTERIOR SYNECHIÆ.

By WILLIAM LANG.

THAT an anterior synechia should, if possible, be divided, is a proposition which will be readily conceded by every ophthalmic surgeon. It is simply the risk of wounding a clear lens, and the difficulty of completing the division of the adhesion in a partially or completely empty chamber, which drives the operator to perform an iridectomy, or even two small iridectomies, one on either side of the adhesion, instead of separating the iris from the cornea.

Many methods have been tried, and many instruments devised for accomplishing this latter object, but the premature escape of the aqueous or the difficulty of manipulating a sharp-pointed instrument in the anterior chamber has hitherto prevented any method from being generally adopted.

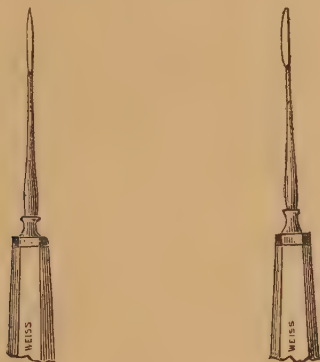
For operative purposes it is well to divide anterior synechiæ into three groups:—1. Where the adhesion has been small and has stretched, allowing the iris to return to its normal plane. 2. Where a large piece of iris is adherent to or entangled in the cornea, but does not involve the whole width of the iris, so that an instrument can be passed between iris and cornea at the periphery of the anterior chamber. 3. Where the adhesion is very extensive (adherent leucoma) or where it extends to the periphery of the anterior chamber. The method of treatment varies for each group. In the first group a Knapp's dissection-knife answers perfectly well for the division of the small thread, the lens being in no danger, as the aqueous can only escape on withdrawing the knife.

In the second group an iridectomy is usually performed, or the case is left without treatment, in the hope that secondary glaucoma will not supervene.

In the third group iridectomy is called for, and should be performed as soon as possible after the inflammatory symptoms, set up by the disease or injury, have subsided.

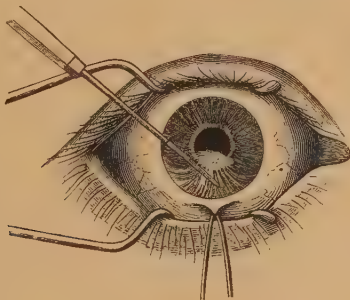
It is in the second group of cases that the following operation has given me a perfect result on every occasion that I have performed it.

The two knives here depicted are essential for performing the operation :—



They are an ordinary Knapp's discision-knife, and a similar knife with a blunt point.

The eye being cocainised, and the lids separated by a speculum, the globe is fixed close to the adhesion, and the sharp-pointed knife passed into the anterior chamber through the cornea, at a point as far removed as possible from the synechia, but so chosen that the blunt-pointed



knife, which is inserted through the opening in the cornea made by the sharp-pointed knife, can be easily made to pass between the cornea and iris beyond the synechia.

No difficulty is experienced in dividing the anterior synechia, if a sawing motion be given to the knife at the same time that it is pressed against the adhesion.

The opening in the cornea is of necessity very small, and it is therefore advisable to select some point in the iris as a landmark, so as to find it readily when the blunt knife has to be inserted. I have never found any difficulty in discovering the opening; but to ensure success I never take my eye off the wound, my assistant exchanging the knives for me.

If the sharp-pointed knife is entered in a manner similar to that usually done for cataract extraction (a little obliquely through the layers of the cornea, and not at right angles, as in needling), no aqueous escapes on its withdrawal, and the blunt knife enters into a full chamber.

Care must be exercised not to do anything more than puncture the cornea, or the wound will be too large to be plugged by the shaft of the blunt-pointed knife.

On withdrawing the blunt-pointed knife after the completion of the division, the aqueous sometimes escapes, but as the opening in the cornea is so small the chamber is soon reformed, and without further treatment the iris regains and retains its normal plane.

The six cases in which I have performed this operation have all been successful, and in four, at least, iridectomies were thus avoided, and in each only a small fragment of iris remained adherent to the cornea after the division.

Messrs. Weiss have made the knives in the most perfect manner, the blunt-pointed knife accurately plugging the hole made by the sharp-pointed one, so that no aqueous escapes, the essential point in the operation.

INDEX TO VOL. XII.

	PAGE		PAGE
Amaurosis from cerebral tumour without optic neuritis ..	258	COLLINS, TREACHER, Curator's Pathological Notes ..	334
Amblyopia, relation of, to convergent strabismus ..	145	— — — Primary sarcoma of iris ..	273
— tobacco, case of unioocular ..	51	— — — Treatment of suppuration after cataract extraction ..	179
— tobacco, observations on ..	51	COLLINS, TREACHER (and WALKER), Cases of orbital cellulitis with partial necrosis of frontal bone and cerebral abscess ..	281
Arthropoda, compound eye in ..	109	COLLINS, W. J., Capsulo-pupillary membrane with varieties of its persistence ..	195
Asthenopia of neurasthenics ..	324	— The asthenopia of neurasthenics ..	324
Atropine irritation ..	164	Coloboma of lower eyelid ..	255
BARRETT (and LANG), Frequency of cilio-retinal vessels and of pulsating veins ..	59	Colour-perception, nature of ..	101
— — — On concomitant convergent strabismus ..	7, 133	Conjunctiva, cases of epithelioma and sarcoma affecting ..	263
BERRY, Note on a congenital defect (? coloboma) of lower lid ..	255	Cornea, cases of epithelioma and sarcoma affecting ..	263
— Retro-bulbar neuritis, and the condition of the light-sense in that affection ..	244	— hernia of lens through perforation in ..	342
BROWNE, Central choroiditis in children, with slight cerebral symptoms ..	238	— ulceration of, probably gouty ..	63
Capsulo-pupillary membrane, varieties of persistent ..	195	Curator's Pathological Report (Lawford) ..	43
Cataract, complications after extraction of ..	19	— — — (Collins) ..	334
Cataract extraction, commencement of suppuration after ..	32	Descemetitis ..	298
— — — glaucoma after ..	39, 226	Diagnosis and treatment, cases illustrating questions in ..	61
— — — treatment of suppuration after ..	33, 179	DOYNE, Observations on tobacco amblyopia ..	51
— lamellar, pathological anatomy of ..	184	Epithelioma affecting cornea and conjunctiva ..	263
Children, central choroiditis in ..	238	Eye, hæmorrhage into, in young men ..	201
Choroid, numerous lacerations of, from blow ..	61	— tubercular disease of ..	149
Choroiditis, central, in children ..	238	— unusual injuries of ..	305
Choroido-retinitis, unioocular ..	68	Eye-complications in connection with hæmophilia ..	70
Cilio-retinal vessels, frequency of ..	59	Eyeball, foreign body rebounding from fundus of ..	338
COLLINS, TREACHER, Atropine irritation ..	164	— rupture of, with displacement of lens ..	345
— — — Complications after extraction of cataract ..	19		

	PAGE		PAGE
Eyelid, congenital defect of lower	255	Infusoria, light-percipient organs	
Eyelids, syphilitic disease of ..	156	in	107
Frontal sinus, distension of with		Injury to eye and orbit, unusual	
mucous polypi.	351	cases of	305
Glaucoma, binocular symmetry		Intra-ocular hæmorrhage in	
in	78	young men	201
— following cataract extrac-		Invertebrata, light-percipient	
tion	226	organs in	108
— hæmorrhagic	216	Iris, primary sarcoma of ..	273
— heredity in.	77	Keratitis, interstitial, knee-jerk	
— in connection with myopia	225	in cases of	312
— in early life	220	— punctata	298
— spontaneous arrest of ..	77	Lamellar cataract, pathological	
— chronic, choice of operation		anatomy of	184
in	100	LANG, Division of anterior	
— — eserine in	80	synechiæ	356
— — failure of operation in	98	— Microphthalmos with cysts	
— — operative treatment of	83	of the globe	289
— — prognosis in	72, 215	— (and BARRETT), Frequency	
— — prognosis as to result		of cilio-retinal vessels and of	
of operation in	96	pulsating veins	59
— — progress of	74	— — On concomitant con-	
Gout, corneal ulceration probably		vergent strabismus	7, 133
due to	63	— (and WOOD), Patellar ten-	
Gouty congestion of eye damaged		don-reflex in cases of intersti-	
by old choroiditis	68	tial keratitis	312
— ocular inflammation, change		LAWFORD, Cases of epithelioma	
of climate for	64	and sarcoma affecting cornea	
GUNN, Nature of light-percipient		and conjunctiva	263
organs and of light- and colour-		— Cases of orbital sarcoma in	
perception	101	children	43, 329
Hæmophilia, intra - orbital		— Cases of tubercular disease	
hæmorrhage in	70	of eye	149
Hæmorrhages in cases of glau-		— Pathological anatomy of	
coma	216	lamellar cataract	184
Hæmorrhage into eye in young		— Remarks on keratitis punc-	
men	201	tata	298
Hemianopsia, right lateral, after		LAWSON, Case of tumour of optic	
injury	332	nerve	1
HUTCHINSON, JON., Cases illus-		Lens, displacement of, through	
trating questions, diagnosis,		ruptured globe	345
and treatment.	61	— hernia of, through perfora-	
— Cases of hæmorrhage into		tion in cornea	342
eye in young men	201	Light, certain effects of, on	
HUTCHINSON, J., Jun., Amauro-		plants	101
sis from cerebral tumour with-		Light-perception, nature of ..	101
out optic neuritis	258	Light-percipient organs, general	
— Some unusual cases of in-		conclusions on	130
jury to eye and orbit. . .	305	— — — nature of	101
— Syphilitic disease of the		Light-sense, existence of, in eye-	
eyelids	156	less animals	104
		— — — in retro-bulbar neuritis	244

	PAGE		PAGE
Microphthalmos with cysts of the globe	289	Sarcoma of iris, primary ..	273
Myopia, glaucoma in connection with	225	— of orbit in children ..	43, 329
NETTLESHIP, Prognosis in chronic glaucoma	72, 215	SMITH, PRIESTLEY, Case of intra-orbital hæmorrhage and other eye complications in connection with hæmophilia	70
Neuritis, retro-bulbar, light-sense in	244	Strabismus, concomitant convergent	7, 133
Optic nerve, tumour of	1	— convergent, age of commencement of	140
— neuritis, absence of, in amaurosis from cerebral tumour.	258	— — alteration of vision in squinting eye in	133
— — possibly gouty, case of	65	— — average vision of amblyopic eyes in	135
— — protracted convalescence after	331	— — causation of	145
— — without obvious cause	67	— — heredity in	137
Orbit, foreign body in	308	— — influence of atropine on	147
— hæmorrhage into, in connection with hæmophilia	70	— — refraction in cases of	16
— necrosis of wall of, with orbital cellulitis and cerebral abscess	281	— — relation of amblyopia to	145
Orbital sarcoma in children, cases of	43, 329	— — result of treatment of	7
Persistent capsulo - pupillary membrane, varieties of	195	Synechia, division of anterior	356
PHILLIPS, Reports of cases	331	Syphilitic disease of eyelids	156
Phototaxis	101	Tobacco amblyopia, observations on	51
Protozoa, light-percipient organs in	107	— — uniocular	51
Retina, dragging forward of, at ora serrata	334	Treatment and diagnosis, cases illustrating questions in	61
— of Vertebrates, changes produced by action of light on	124	Tubercular disease of the eye	149
— pigmentation of, following blow on eye	61	Vertebrata, light - percipient organs in	113
Retinal pigment, function of	131	WALKER, C. H., Distension of frontal sinus with mucous polypi	351
— purple, function of	132	— (and COLLINS), Case of orbital cellulitis, with partial necrosis of frontal bone and cerebral abscess	281
— venous pulse, frequency of	60	WOOD, C. A. (and LANG), Patellar tendon-reflex in cases of interstitial keratitis	312
Retro-bulbar neuritis, light-sense in	244	Zonular cataract, pathological anatomy of	184
Sarcoma at sclero-corneal junction	269		

